

FLIGHT

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ENGINEER
&
AIRSHIPS**

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"FLIGHT" PHOTOGRAPHS

To those desirous of obtaining copies of "Flight" Photographs, these can be supplied, enlarged or otherwise upon application to Photo. Department, 36, Great Queen Street, W.C.2.

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1929

May 21.... Northampton Air Pageant
July 13.... R.A.F. Display at Hendon
July 16-27 7th International Aero Exhibition, Olympia
Oct. 31.... Guggenheim Safe-Aircraft Competition Closes

Hearty Good Wishes for a Healthy and Happy Christmas and a Prosperous New Year to all "Flight" readers. From the Editor and Staff of "Flight," Christmas, 1928.

EDITORIAL COMMENT



ON Monday of this week, December 17, the twenty-fifth anniversary of the first power-driven flight was celebrated by the Royal Aeronautical Society of Great Britain to commemorate the flight of 12 seconds' duration made by the Wright Brothers at Kill Devil Hill, North Carolina, U.S.A., on December 17, 1903.

Without wishing to enter into the arguments that have taken, and are still taking, place as to who was the first to leave the ground in a power-driven heavier-than-air craft, one may at any rate give honour where honour is due by regarding this flight of 1903 as the first of a series of flights which demonstrated conclusively not only the possibility of flight, but the possibility of *controlled* flight. That early Wright biplane was the logical outcome of the results of numberless glider experiments during which the brothers had found out for themselves the need for controllability. More than that, they had found ways and means of controlling a heavier-than-air craft. The elevator (placed in front in the early machines) for rising and descending, the rudder for steering, and the warping wings for righting the machine if it was tilted over to one side or the other. Moreover, the Wright Brothers had already discovered that when the wings were warped for lateral control, the wing which had its angle of incidence increased (for such, of course, was the action of the warping wing) had a greater drag than that which had its angle decreased, so that "opposite rudder" was required to keep the machine from "yawing." That the warping wing gave place, after but a few years, to the use of hinged wing flaps

Twenty-five Years of Flying

does not detract in the least from the original Wright discovery, and even after all these years there is still quite a possibility that the wing flap will, in turn, be superseded as an organ of lateral control. It is by no means perfect; it suffers very much from the same vices as did the warping wings. It produces a yawing moment of "the wrong sign," and normally it becomes ineffective at angles beyond the stall. But we are still using it, and except for structural considerations it is doubtful whether we should have been so very much worse off had we retained wing warping. Let us, therefore, do honour to those two great brothers, one of whom it has not unfortunately been granted to survive to see the full development of his early work, who had the foresight and the courage to carry on in face of terrific difficulties with their great discovery.

A quarter of a century after the first properly-controlled flight, it is of interest, although a matter of great difficulty, to attempt to assess the progress that has been made during the 25 years. Mere figures will not necessarily give us a true picture. Apart from the actual performance in miles per hour, there is the useful load carried, which may be either in the form of paying load over a relatively short distance, or may be in the form of fuel for the purpose of covering the greatest possible distance without alighting. And then there is the human factor, which has also played a very prominent part in enabling us to do what is today an everyday feat with the machines as they now exist.

The original Wright biplane had a four-cylinder "in-line" water-cooled engine, which developed something like 12 b.h.p. Of the total loaded weight of the machine we have, unfortunately, no reliable figures, but we are under the impression that the power loading was in the neighbourhood of 40 lbs./h.p.! Not until comparatively modern times was another machine produced which flew successfully with such a power loading. This was the little "Wren" monoplane designed by Mr. W. O. Manning, and built by the English Electric Co. Fitted with an A.B.C. motor-cycle engine, which developed about 11 b.h.p., this machine flew quite "strongly," i.e., it was not a "no speed range" machine. It is very tempting to compare these two types of aircraft, the original one, a biplane braced by a maze of wires (it used to be said, in the old days, of a certain type of early British biplane that if there was room for a thrush to fly between two wires, another wire should be put in; this was known as the "thrush test"!), and the more modern one, a cantilever monoplane, in which streamlining was carried out according to the latest notions and induced drag kept down by having a very light span loading. The original Wright biplane had, we believe, a speed of just over 30 m.p.h.

The "Wren" probably was capable of about 50 m.p.h. or so. The question which naturally arises is: Is the "Wren," to take a typical modern example, a very great improvement upon the original Wright biplane? We think the answer to that must undoubtedly be yes. The climb of the "Wren" was very good, and must have been very much better than that of the Wright. The "Wren" started from the ground under its own power. The original Wright biplane was catapulted off. The aerodynamic efficiency, expressed as maximum ratio of lift over drag, must have been vastly better in the case of the "Wren," which, in spite of its fast-running, direct-drive engine was at least 50 per cent. faster, with an engine of approximately the same power.

But we should not lose sight of the fact that the engine of the "Wren" probably did not weigh much more than one-half of the Wright engine of 1903. This fact is, therefore, in some measure to be offset against the geared propellers of the Wright biplane. On the other hand, every possible credit is due to the Wright Brothers for having, at that early date, discovered for themselves the advantages of the geared propeller. We have for years shirked the difficulties connected with the production of suitable gearing for modern high-power engines, and it is not until comparatively recently that a really serious effort is being made to attain what, 25 years ago, the Wright Brothers knew to be desirable. Progress we have certainly made in the design and construction of aircraft. But the greatest progress has been connected with the power plant.

We have referred to the fact that the first Wright biplane was catapulted off the ground. It is somewhat curious to reflect that there are those who hold, in modern times, that for certain purposes catapult starting will again become, in future, quite a usual form of starting. Already such a form of starting, a little more elaborate, and not depending upon a dropping weight for its functioning, is used regularly for starting aircraft from surface vessels. Thus once more we see history repeating itself.

We are rather proud of the fact that today speeds of nearly 320 m.p.h. have been attained. Altitudes of 38,400 ft. have been recorded, and aircraft have covered 4,750 miles without alighting, and have remained in the air continuously for 65 hours without refuelling, to mention but a few among the numerous world's records recognised by the F.A.I. Brilliant as these results are, and no matter how much they may be improved during the next 25 years, they can never dim the glory that will for ever surround the names of those two great brothers, Wilbur and Orville Wright, whose first flight, of only 12 seconds' duration, was made over the sand dunes of North Carolina on December 17, 1903.

American Combine

THE New York correspondent of the *Daily Telegraph* reports on December 17 a merger in the aircraft industry providing for the largest consolidation yet undertaken, resulting in the formation of a corporation with securities exceeding £30,000,000 in market valuation. The name of the new corporation will be United Aircraft and Transport, and it will own the stock of various concerns, with Mr. W. Boeing, president of the Boeing Airplane and Transport, as chairman of the board. Other directors will be officials of the National City Bank, General Motors Corporation, Ford Motor Co., and the Standard Oil Company.

In Memory of Amundsen's Discovery

ON December 14 Oslo stopped work for two minutes at noon, flags were lowered to half-mast, and church bells rang

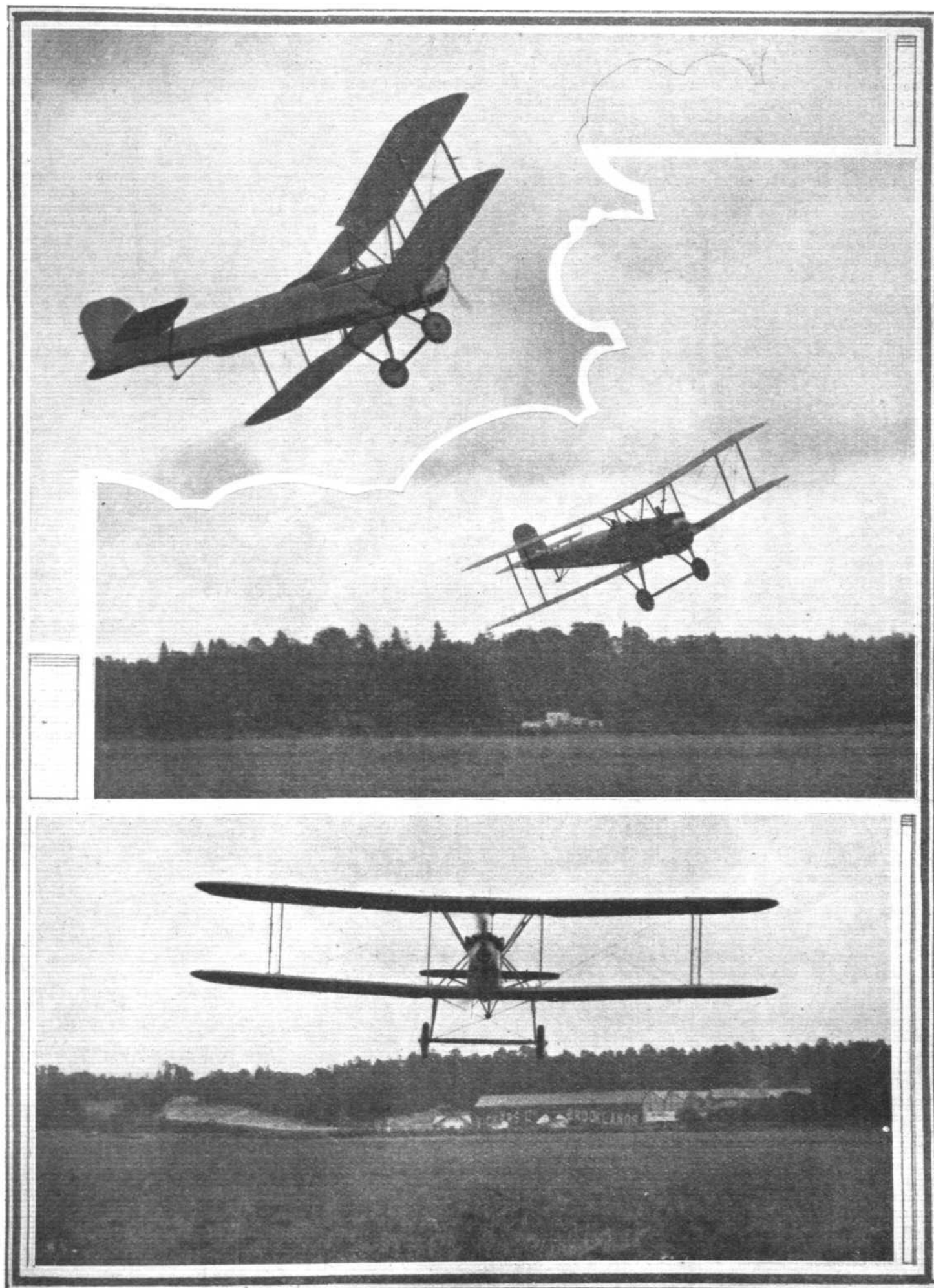
all over Norway to commemorate the anniversary of Capt. R. Amundsen's discovery of the South Pole. The King and Crown Prince and members of the diplomatic body took part at an impressive meeting at Oslo.

Appeal for Aerodromes

MAJOR R. H. S. MEALING, of the Air Ministry, lectured to the Town Planning Institute at Caxton Hall on December 14 and urged the need for local aerodromes. He said that there were only five Government aerodromes in this country as compared with 254 municipal aerodromes and landing grounds in Germany and 391 in America.

Group-Capt. Bigsworth

GROUP-CAPT. A. W. BIGSWORTH, Chief Staff Officer, Coastal Command, has been appointed to represent the R.A.F. on the Council of the Navy, Army and Air Force institutes.



VICKERS MACHINES FOR SOUTH AMERICA : Three views of the "Vendace" advanced training machine, in flight. Fitted with a 330-h.p. Hispano 8F engine, this is the first machine of a batch which Vickers are supplying to a South American Government.

WILBUR WRIGHT ANNIVERSARY BANQUET

WHEN, twenty-five years ago, Wilbur and Orville Wright made their historic flight, the first ever made in a power-driven aircraft, few people would have visioned the amazing progress which would be made in the succeeding quarter of a century. The machine on which the flights were made in December, 1903, is now in the South Kensington Museum, and on Monday, December 17, 1928, a banquet was held in the museum to celebrate these flights—the tables being arranged round the machine itself. Colonel Sir Henry Lyons, F.R.S., Director of the Science Museum, had given every facility to the Royal Aeronautical Society for arranging this unique banquet, and many distinguished guests foregathered in honour of the event.

Colonel the Master of Sempill, A.F.C., A.F.R.Ae.S., President of the Society, presided.

At the banquet the prizes awarded by the Council were presented. These included the R.38 Memorial Prize for the best paper on some subject of a technical nature, preference being given to papers which related to airships. The prize was awarded to Mr. H. Roxbee Cox, Ph.D., D.I.C., B.Sc., A.F.R.Ae.S., for his paper on "The External Forces on an Airship Structure with Special Reference to the Requirements of Rigid Airship Design."

The Sir Charles Wakefield Gold Medal, awarded to the designer of any invention or apparatus tending towards safety in flying, was awarded to Mr. F. Handley Page, C.B.E., F.R.Ae.S., for his work on the Automatic Slot.

The Simms Gold Medal, for the best paper read in any year before the Society on a science allied to aeronautics, e.g., meteorology, wireless telegraphy or instruments, to Captain F. Entwistle for his paper on "Fog," read before the Society on December 8, 1927.

The Taylor Gold Medal, for the most valuable paper submitted or read during the previous Session, was awarded to Mr. R. K. Pierson, B.Sc., F.R.Ae.S., for his paper on "The Use of the Wind Tunnel for Performance Prediction."

The Society's Silver Medal, for an advance in aeronautical design, was awarded to Mr. B. N. Wallis, for his work on R.100.

Following the dinner a brief address was given by Mr. Griffith Brewer, F.R.Ae.S., a Member of Council, and for many years closely associated with the Wright Brothers, on the Wright machine. Afterwards those present took the opportunity of examining the Aeronautical Section of the Museum, and some models of historic aeroplanes displayed by Maj. Villiers. These included the 1903 Wright Bros.' biplane; Mr. A. V. Roe's biplane, on which he made a flight at Brooklands on June 8, 1908; the Cody British Army biplane of 1909; the 1909 Roe triplane (9 h.p. Jap engine); Bleriot's cross-channel monoplane of 1909; Henry Farman's biplane on which he made a world's duration record flight of 4 hrs. 18 mins. on March 3, 1909; and the Supermarine-Napier S-5 monoplane, on which Flight-Lieut. Webster won for England the Schneider Trophy in 1927.

The company, having honoured the toasts of the King, the President of the United States of America and the Royal Family, the Chairman read a number of congratulatory messages from various kindred associations, as follows:—

From Mr. Orville Wright.—"I am on the way to Kitty Hawk to visit the spot on which the first flight was made, 25 years ago, with the machine around which you are now gathered. Heartiest greetings to all members and guests assembled on this occasion.—Wright."

From the International Civil Aeronautics Conference at Washington.—"The International Civil Aeronautics Conference of Washington greets your gathering on the 25th anniversary of the Wright Brothers' first flight.—William P. MacCracken, Junr."

"The International Civil Aeronautics Conference assembled in Washington acknowledges your greeting on this historic occasion, the 25th anniversary of the first flight ever made by man in a power-driven heavier-than-air machine. The Conference learns, with considerable satisfaction, of the arrangements that have been made to honour that epoch-making event in Great Britain and considers it appropriate that this ceremony should take place around the original Wright aeroplane, now housed in the Science Museum in London, for the benefit of visitors from all parts of the world. The Conference is very happy to be, in spirit at least, associated with the Royal Aeronautical Society in marking an achievement which certainly opened a new era to civilisation.—William P. MacCracken, Junr., Chairman, International Civil Aeronautics Conference."

From the Aero Club of France.—"As President of the Historical Commission and Centre de Documentation of the Aero Club of France, also as an old pupil of Wilbur Wright, I associate myself warmly with the commemoration of the first flights of the Wright Brothers.—Paul Tissandier."

The Master of Sempill, proceeding, said the council, after very carefully considering who should have the privilege of addressing them that night upon the subject of the first flight, decided that Mr. Griffith Brewer should be selected. The Chairman mentioned a few particulars of the aeronautical work accomplished by Mr. Brewer, who, he said, was a man of very great modesty, and of his association with and help to the Royal Aeronautical Society, finally pointing out that it was due to his influence that they were enabled to be dining together under the Wright Bros.' original machine.

Mr. Griffith Brewer, who said he felt deeply the great honour done him in being enabled to speak to the work of these great pioneers, then gave a concise and intimate review of the persevering experiments which ultimately led the Wright Brothers to their great successful achievement.

Mr. Griffith Brewer, in giving his account of the early work of the Wright Brothers, said in order to appreciate the early work of Wilbur and Orville Wright, which culminated in the invention, construction, and the flying of the first aeroplane, it is necessary to take our minds back to the end of the last century, when there was a flying problem but not as yet a flying art.

"Many of us here," he said, "will recollect that at that time, when one wished to emphasise that something was impossible, it was common to say: 'You might as well try to fly.' No one quibbled at this definition of the impossible."

"One day in the early nineties, when I was piloting a balloon under the tuition of the late Mr. Percival Spencer, he pointed out Baldwin's Park ahead of us in our line of flight, where Sir Hiram Maxim was building a gigantic aeroplane. In those days a balloon was always a welcome visitor, so without hesitation I opened the valve and we made a good landing in the park. Mr. House, who was in charge of the construction at that time, invited us into the shed, where he showed us the machine and explained what they expected the machine to do. When Mr. Spencer and I left Baldwin's Park, we agreed that the machine was extremely interesting, but we were quite convinced in our minds that mechanical flight was still impossible."

"The Wright Brothers did not become seriously interested in the problem of flight until several years after the Maxim machine had been built. They learned from the literature then available that acknowledged leaders in science such as Sir George Cayley, the Hon. Chas. Parsons, and Sir Hiram Maxim, had all studied the problem, and comprised that school which believed that the best method of attaining flight was to build a power machine and then learn to fly it."

"There was another group, which included Otto Lilienthal, Octave Chanute and Pilcher, who believed in learning to fly on a glider before building the power machine."

"The Wrights, having learnt from the books what had been already tried, recognised that the main problem was that of equilibrium, and not merely the application of power to wings which would support that power. They, therefore, decided to build a glider, and to fly it as a kite in a high wind, with one of the brothers on board, so as to learn to balance it."

"Their first departure from book practice was the system of balancing the glider by changing the angles of wing tips, instead of by attempting to change the position of the pilot. This last method had proved fatal to Lilienthal and Pilcher."

"Wilbur explained their choice of learning to fly on the machine itself, when he said that there were two ways of learning to ride a horse; one way was to mount and learn by actual practice how each motion could be met; and the other was to sit on a fence and watch the horse and figure out the best way of overcoming his jumps and kicks. The latter system, Wilbur Wright said, was the safest; but the former turned out the larger proportion of good riders."

"This explains the Wrights' methods in their flying experiments. Nothing was assumed to function in any particular way until it had first been tested and proved to be true."

"Their first glider had an area of 165 ft., and they took it to Kitty Hawk, where they had been told by the Weather Bureau that the strongest winds prevailed. The wings were not made to any particular formula, but to a guessed curve of 1 in 22."

"At Kitty Hawk (which took these young enthusiasts two or three days to reach from Dayton, Ohio), they found that in a wind of 25 m.p.h. the machine flew at an angle of about 20° ; and in order to fly the machine as a kite at small angles, they had to fly it without an operator on board and manipulate the controls by cords from the ground. They made a long series of actual measurements of lift and drift of the machine under various loads. These were probably the first full-scale measurements taken of lift and drift, and revealed the first discrepancies in existing tables, the lift being far less than they had been led to expect. They assumed that the depth of curvature of 1 in 22 was insufficient, and they decided that the second glider which they intended to build in the winter at Dayton, and take to Kitty Hawk the following summer, should have the recognised Lilienthal curve of 1 in 12.

"Owing to the difficulty of flying the machine as a kite with one of them on board, they took the machine to Kill Devil Hill, which rises from the flat sand to a height of more than 100 ft., and they made short glides lying full length on the lower wing in order to save head resistance. The slope of the hill was a drop of 1 in 6.

"The following year they brought their second glider to

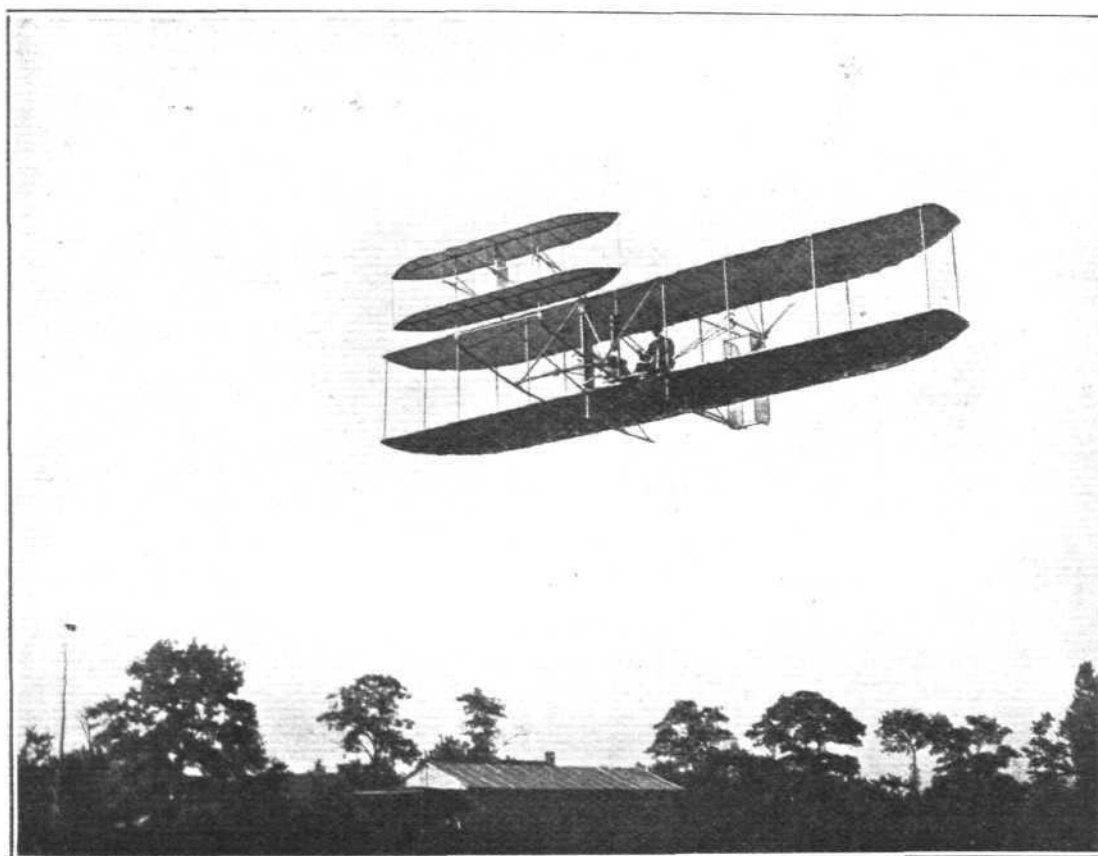
27 m.p.h. They were, however, unable to fly the machine as a kite with the operator on it, owing to the poor lift, in spite of the fact that the second glider was nearly twice the area of the first.

"They discovered, on this second glider, that the pressure was inclined forward of the perpendicular, and this confirmed Lilienthal's discovery; but the measurements for lift and drift observed by the Wrights differed greatly from those given by Lilienthal.

"They also discovered that their method of lateral balance, by changing the angle of the tips of the wings, acted in the reverse manner when gliding to the way in which it acted when flying as a kite.

"On September 18, 1901, Wilbur read his classic paper before the Western Society of Engineers. All their work up to that time is described in that paper with the clearness and accuracy only possible from the pen of a master scientist. So clearly is their work set out, that the paper has been used to show that the Wrights published their invention of warping control before applying for their patent, and were therefore entitled to no reward.

"Having discovered, contrary to the teaching of the books, that the centre of pressure of a curved surface travelled back-



Mr. Wilbur Wright flying one of the early Wright biplanes—the first practical development of the 1903 Kitty Hawk experimental machine—at Le Mans, in August, 1908.

Kill Devil Hill. The new machine was 308 sq. ft., and the camber of the wings was the Lilienthal curve of 1 in 12. On the first glide the machine turned downwards and landed after going only a few yards. On successive glides the operator lay farther and farther back on the machine until, after several short glides, the machine flew on an undulating glide for 300 ft. No one save the operator knew that it required all the power of the elevator to keep the machine from diving or running high up into the air and then stalling.

"After several very dangerous glides of this character, they came to the conclusion that the trouble was due to the deep curvature, 1 in 12, and it was suspected that this induced a reversal of the centre of pressure at small angles. To test this, they took the upper surface off the machine and attached it by two cords to its front edge. They then found that in a light wind, the surface flew at a large angle; in a moderate wind it flew straight; and in a strong wind it pointed downwards. This confirmed their suspicion that the centre of pressure travelled backwards when the angle became small, and would produce diving unless sufficiently guarded against. They therefore rebraced the surfaces so as to restore the original curve of 1 in 22. With this curve they now succeeded in making a large number of glides in winds up to

wards when the surface was inclined at small angles, and that measurements and formulæ published by different investigators were contradictory, they found it necessary to test everything for themselves. Up to this time, they had taken up flying mostly as a sport: now they entered upon the serious scientific side of it.

"A wind tunnel was built in which they tested about 50 various shaped model surfaces at intervals of $2\frac{1}{2}^\circ$, and they made tables of all the measured results. The third glider was constructed by calculation from these tables.

"In the autumn of 1902, this third glider was taken to Kill Devil Hill, where they made nearly 1,000 gliding flights, several of which covered distances of over 600 ft.

"On this machine a vertical rudder was installed, adjusted simultaneously with the warping of the wings, so that by automatically turning the rudder towards the side of the machine where the wing was at the greatest angle, the warping was made to function correctly, both when gliding and when flying as a kite.

"They now returned home to Dayton and built the first power machine. They were obliged to build their own engine, because no suitable engine was available. They had also to design and make the propellers. This entailed a

further series of experiments occupying several months, but it resulted in a propeller built entirely from their calculations, which gave useful work of 66 per cent. for the power expended, Orville Wright has told me that their propeller research was probably one of their chief works in attaining success.

"If you look at the machine, you will see instruments on it which automatically record the distance flown through the air and the time occupied in flying that distance. Each flight was methodically recorded, so that the lesson learned from each test could be utilised in later tests.

"The long research work on the propellers delayed the completion of the power machine, so that the Wrights arrived at Kitty Hawk very late in the season, and the first power flight did not take place until December 17, 1903. So confident were they of success, however, that they sent a general invitation out to people of the neighbourhood to come and see the first flights. The cold December wind prevented all but five people availing themselves of the invitation.

"The machine was launched by running it on a two-wheeled trolley along a wooden rail laid upon the sand, with a man at each wing to keep the machine in balance after the engine had been started and until it got towards the end of the rail and was able to take the air; and so carefully had every-

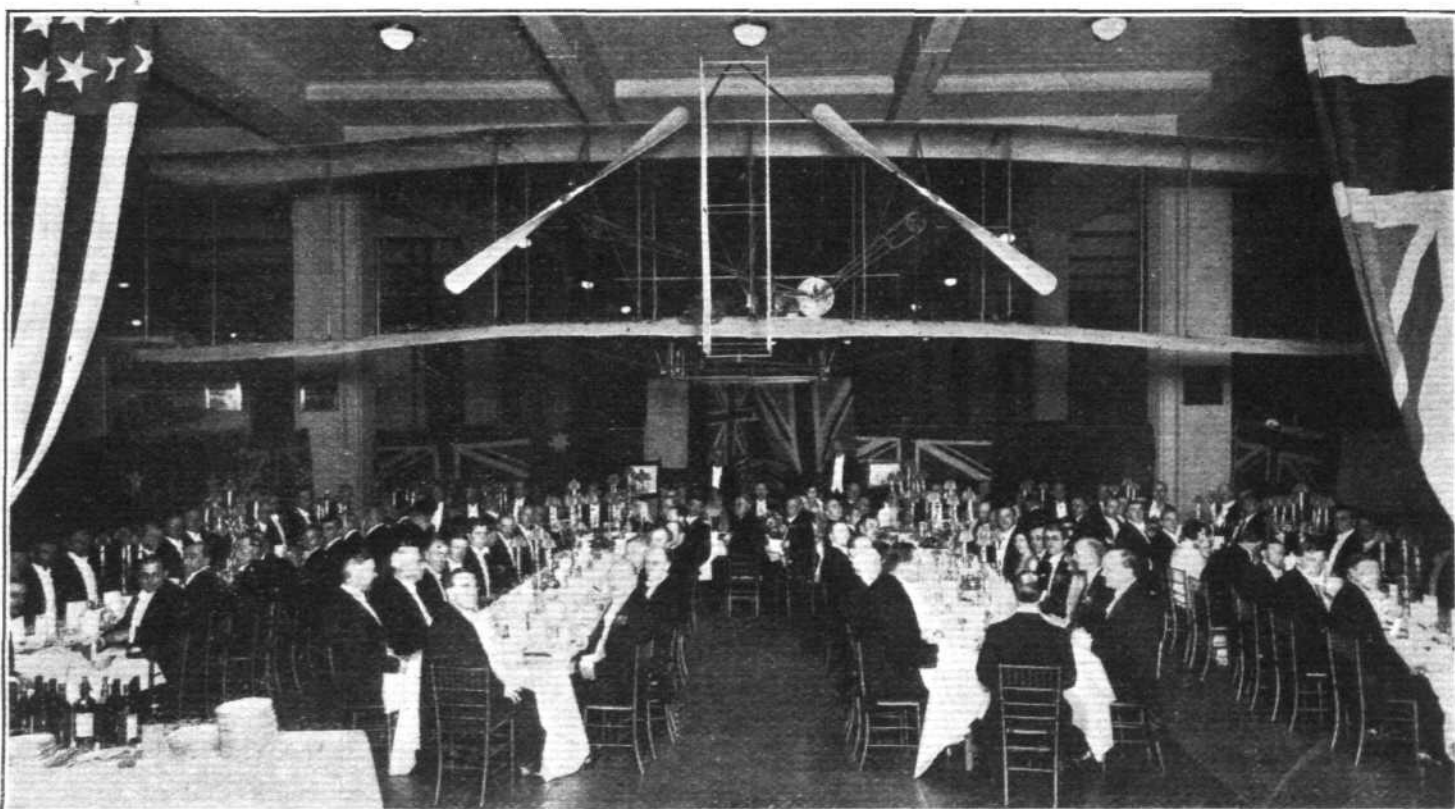
Wright in Dayton, and we discussed whether it would be better to re-erect the machine with all the original parts as a museum relic, or whether to restore the machine to its original state. He decided, and I think very wisely, to restore it, the parts renewed to be identical with the original parts. The canvas on this machine is new, but it is bought from the same store in Dayton, and is of the same texture as the 'Pride-of-the-West' muslin originally used. The same care in restoration has been exercised in all the parts, and the struts which have been replaced are identical with those which were broken.

"And so we have the privilege of being able to view this first machine which flew, the forerunner of the new flying art which commenced 25 years ago."

Mr. Brewer concluded his address by asking the company to drink to the health of Mr. Orville Wright and to the memory of the late Wilbur Wright.

The President then presented personally or by proxy the medals and awards referred to above.

The toast of "The Guests" was in the hands of Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., etc., who, after a very sympathetic speech, referring to those pioneers who had fallen by the way and who were not forgotten, said he was looking forward to the next 25 years and wondered where we were



WILBUR WRIGHT ANNIVERSARY BANQUET: The guests at South Kensington Museum seated beneath the actual aeroplane in which Wilbur Wright made the first flight at Kitty Hawk on December 17, 1903.

thing been calculated, that this machine—home made in every detail—when it left the rail was flown by Orville Wright in perfect balance, maintaining its height above the sand and landing at the end of this first flight without smashing, and in perfect order for flight again.

"After they had brought it back to its starting point, Wilbur flew the machine, and then Orville made the third flight, and Wilbur made the last flight on that day. That last flight lasted for 59 secs., covering a distance of 852 ft. over the ground, against a 20-mile wind. Then, as a cruel sequel to the greatest mechanical achievement ever performed by man, a gust of wind caught the machine, rolled it over, and made it a wreck; so that flying again on the same machine was impossible without considerable restoration work in their laboratory at Dayton.

"Those four flights were the only flights this machine ever made. The broken parts remained in the packing cases for several years, until, in 1912, a flood burst the banks of the river and swept through Dayton, doing enormous damage; and amongst other damage it covered the packing cases with water and mud and left the broken machine in a still worse state of repair.

"When it was decided that the machine should come to the Science Museum, I examined the broken machine with Orville

going to fly with what the Wrights had given us. No nation in the world, he thought, required sound aerial development so much as our own country. Speaking on behalf of the Royal Aeronautical Society, they had to pay their tribute to the scientific side of aeronautics as against the practical work of the Wright Brothers and other eminent men, and in this connection he coupled the toast with the name of Sir Richard Glazebrook, K.C.B., etc., Chairman of the Aeronautical Research Committee.

Sir Richard having replied briefly the Chairman invited the guests after the dinner to examine the wonderful aeronautical exhibits in view in the adjoining hall and specially thanked Col. Sir Henry Lyons, by whose courtesy they were enabled to be dining there together that evening.

Sir Henry Lyons, who expressed his thanks for the reception of the toast, said that the Science Museum Authorities had asked for a copy of the original machine and then Mr. Griffith Brewer came on the scene and through Orville Wright obtained the loan of the original machine for five years.

Mr. C. R. Fairey, M.B.E., then asked the company to toast their Chairman, who, he said, had with extreme modesty refrained from mentioning his own untiring work, which had brought so many benefits to that Society. Mr. Fairey also said he could not refrain from mentioning with all honour

another pioneer of over 80 years ago—he referred to Stringfellow—who then designed an aeroplane with every attribute for practical flight, which would undoubtedly have been accomplished, except for the one missing link—a motor capable of elevating the machine into actual flight.

The Master of Sempill, having expressed his thanks for his reception, the guests then dispersed to examine the various original machines, engines and models on view.

Amongst those invited to the celebrations were:—

Mr. M. Atkinson Adam, G.Sc., F.I.C.; Mr. Richard W. Allen, C.B.E., J.P., President, Institution of Mechanical Engineers; Sir Alan G. Anderson, K.B.E., President, Institution of Marine Engineers; Lieut.-Commr. M. Awaya, I.J.N.; Major B. F. S. Baden-Powell, F.R.A.S., F.R.Met.Soc., Hon. F.R.Ae.S.; Mr. R. M. Balston; Major T. M. Barlow, M.Sc., M.Inst.C.E., F.R.Ae.S.; Mr. W. E. Bartelf; Sir J. H. Biles, K.C.I.E., LL.D., D.Sc., Hon. Vice-President, Institution of Naval Architects; Mr. Robert Blackburn, F.R.Ae.S.; Mr. M. L. Bramson, A.C.G.I., A.F.R.Ae.S., M.I.Ae.E., Air Vice-Marshal Sir W. Sefton Brancher, K.C.B., A.F.C., F.R.Ae.S., President of the Institution of Transport and Director of Civil Aviation; Mr. Cyril Brewer, A.F.R.Ae.S.; Mr. Griffith Brewer, F.R.Ae.S.; Mr. Mervyn Brown; Maj. J. S. Buchanan, F.R.Ae.S.; Mr. H. Massac Buist, M.R.A.S., A.M.I.A.E., F.I.J., F.Z.S.; Mr. H. Burroughes, A.F.R.Ae.S.; Viscount Carlow; Capt. L. W. Charley, O.B.E.; Senr. de la Cierwa; Mr. T. W. K. Clarke, A.F.R.Ae.S.; Sir Alan J. Cobham, K.B.E., A.F.C., Hon. F.R.Ae.S.; Lady Cobham; Mr. C. G. Colebrooke, Aero Correspondent of *Times*; Mr. M. J. B. Davy; Mr. F. T. Dawson; Mons. C. Dollfus; Lt.-Col. K. Edgcombe, T.D., B.E. (T.), (ret'd.), President Institution of Electrical Engineers; Mr. E. C. Gordon England, A.F.R.Ae.S.; Mrs. E. C. Gordon England; Capt. F. Entwistle, B.Sc.; Mr. C. R. Fahey, M.B.E., F.R.Ae.S.; Mrs. C. R. Fahey; Lt.-Col. L. F. Fell, D.S.O., O.B.E., F.R.Ae.S.; Mrs. Fell; Mr. H. P. Folland, M.B.E., F.R.Ae.S., M.I.Ae.E.; Mr. F. A. Foord, A.F.R.Ae.S.; Hon. Mrs. Forbes Sempill; Mr. George Fyfe, Aero. Correspondent, *Evening Standard*; Mr. H. Hamilton Fyfe; Mr. H. Glaser, O.B.E., M.A., A.F.R.Ae.S.; Sir Richard T. Glazebrook, K.C.B., F.R.S., LL.D., F.R.Ae.S., Chairman of Aeronautical Research Committee; The Lord Gorell, C.B.E., M.C., M.A.; Mr. C. C. Grey, Editor of *The Aeroplane*; Brig.-Gen. P. R. C. Groves, C.B., C.M.G., D.S.O., Hon. Sec.-Gen., Air League; Mr. Kphai Hama; Major H. R. Harmon, U.S.A., United States Army Air

Attache; Captain G. de Havilland, O.B.E., A.F.C., F.R.Ae.S.; Brig.-General Sir Brodie H. Henderson, K.C.M.G., G.C.B., R.E., J.P., President Institution of Civil Engineers; Air-Vice-Marshal Sir John Higgins, K.C.B., K.B.E., D.S.O., A.F.C.; Mr. J. E. Hodgson; Captain A. G. Lamplugh, A.F.R.Ae.S., M.I.Ae.E., F.R.G.S.; Mrs. A. G. Lamplugh; Madame de Landau, C.B.E., Chairman, Ladies' Committee, Air League; Mr. D. Longden, M.I.Ae.E.; Mr. John Lord, F.R.Ae.S.; Major A. R. Low, F.R.Ae.S.; Colonel Sir Henry Lyons, D.Sc., F.R.S., Director of the Science Museum; Lady Lyons; Sir Francis McClean, A.F.C., A.F.R.Ae.S.; Lady McClean; Mr. de Witt McKenzie, Associated Press America; Lt.-Col. W. Lockwood Marsh, O.B.E., M.A., LL.B., A.F.R.Ae.S.; Air Commodore E. A. D. Masterman, C.M.G., C.B.E., C.B., A.F.C.; The Marquis Mayeda, Military Air Attache, Japanese Embassy; Major R. H. Mayo, O.B.E., M.A., F.R.Ae.S., Representative of the Guggenheim Fund; Mrs. R. H. Mayo; Mr. Gerald Merton, M.C., M.A., Ph.D., F.R.S.A.; Mrs. G. Merton; Hon. A. F. de Moleyns; Lt.-Col. J. T. C. Moore-Brabazon, M.C., M.P., F.R.Ae.S., M.I.Ae.E.; Mr. H. H. Morris; Mr. J. L. Naylor, M.A., A.F.R.Ae.S.; Capt. D. Nicolson, A.F.R.Ae.S.; Mr. F. Handley Page, C.B.E., F.R.Ae.S.; Mrs. F. Handley Page; Mr. George Parnall; Lieut.-Commr. H. E. Perrin, O.B.E., Secretary, Royal Aero Club; Press Association, Representative of; Captain J. Laurence Pritchard, Hon. F. R.Ae.S., Secretary, Royal Aeronautical Society; Mr. G. Tilghman Richards, F.R.Ae.S., M.I.Ae.E.; Major F. A. de V. Robertson, V.D., M.A.; Mr. A. V. Roe, O.B.E., F.R.Ae.S.; M.I.Ae.E.; Mrs. A. V. Roe; Mr. H. Russell; Mrs. H. Russell; H. E. S. Saburi, Charge d'Affaires, Japanese Embassy; Mr. F. St. Barbe; Miss O. St. Barbe; Lt. de Vaisseau A. Sala, French Air Attache; Mr. N. Sandberg, C.B.E.; Major T. P. Searight, A.F.R.Ae.S.; Colonel The Master of Sempill, A.F.C., A.F.R.Ae.S., President, Royal Aeronautical Society; Captain K. Shiozawa, D.S.O., Naval Air Attache, Japanese Embassy; Mr. H. O. Short, F.R.Ae.S.; Mr. F. Sigrist, M.B.E., A.F.R.Ae.S.; Mr. Stanley Spooner, Editor of *Flight*; Mr. T. Stanhope Sprigg, Editor *Airways*; Major Oliver Stewart, Aero. Correspondent, *Morning Post*; Capt. R. H. Stocken, A.M.I.Ae.E.; The Dowager Lady Swaythling, Representing English-Speaking Union; Dr. A. P. Thurston, M.B.E., F.R.Ae.S.; Major C. C. Turner, F.R.G.S., A.F.R.Ae.S., Aero. Correspondent, *Daily Telegraph*; Major O. G. G. Villiers, D.S.O.; Air Vice-Marshal Sir Vyell Vyvyan, K.C.B., D.S.O., R.A.F.; Lady Vyvyan; Sir Charles C. Wakefield, Bart., C.B.E., LL.D., Hon. F.R.Ae.S.; Mr. C. C. Walker, F.R.Ae.S.; Air Commodore J. G. Weir, C.M.G., C.B.E., F.R.Ae.S.; Mrs. J. G. Weir; Mr. H. E. Wimperis, O.B.E., F.R.Ae.S., Director of Scientific Research, Air Ministry; Mr. R. McKinnon Wood, F.R.Ae.S.; Squadron Ldr. M. Wright, A.F.C.; Miss Wykes.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

REPORT of meeting of the Committee, December 12, 1928.

Present.—Lieut.-Col. Sir Francis K. McClean, A.F.C., in the chair; Air Vice-Marshal Sir W. S. Brancher, K.C.B., A.F.C.; Griffith Brewer; Lieut.-Col. M. O. Darby, O.B.E.; Major H. A. Petre, D.S.O., M.C.; Capt. C. B. Wilson, M.C.; H. E. Perrin, Secretary; B. Stevenson, Assistant Secretary.

Minutes of meeting held on November 14, 1928, were confirmed and signed.

Election of Members.—The following new members were elected:—John Arthur Watson Bourne; Charles Hedley Briggs; Edward Duncan Crundall; John Durward; Brian Edmund Lewis; Flying Officer John J. Nolan; Arthur Sidney Wilcockson.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

8460	Richard Randolph William	Aero Club Suisse. Rawson Trafford.
8461	Harrington Robley Law	Cinque Ports F.C.
8462	Martin Selby Hall	Hampshire A.C.
8463	Trevenen Penrose Coode	
8464	Leonard Hamersley Bell	
8465	Mary Madge Home	
8466	Thomas Loel Evelyn Bulkeley Guinness	Henderson F.S.
8467	Frank Henry Jolly	Suffolk A.C.
8468	Peter Thorp Eckersley	Lancashire A.C.
8469	James Stanley Austin	Nottingham A.C.
8470	Alfred Cecil Thomas	London A.C.
8471	William Stuart Kay	Lancashire A.C.
8472	Cedric Basil Hartley Crawshaw	Lancashire School of Aviation.

F.A.I. CONFERENCE, PARIS, JANUARY 11, 1929.

LIEUT.-COLONEL M. O'GORMAN, C.B., and H. E. Perrin were appointed delegates to represent the Royal Aero Club at the Extraordinary Conference of the F.A.I. to be held in Paris on January 11, 1929.

The items to be discussed at the Conference include: Regulations for High Speed Records; Automatic Timing for High Speed Records; Award of the F.A.I. Gold Medal for 1928; Custom's Carnets; Schneider Race, 1929; Gordon

Bennett Balloon Race, 1929; International Touring Competition, 1929.

Sub-Committees.—The reports of the following Committees were received and approved: Schneider Race, 1929; Technical Committee; House Committee.

Records.—*Light Aeroplanes.*—1st Category (Two-seater). The following British Record was granted:

Pilot—Alan S. Butler.
Aircraft—D.H. "Moth" 60 G.
Engine—D.H. "Gipsy."
Date—December 7, 1928.
Speed over 100 km.
Performance: 192.864 km. per hour.

The particulars of this performance have been submitted to the F.A.I. for acceptance as a World's Record.

REPORT of Schneider Sub-Committee held on December 12, 1928.

Present: *Royal Aero Club.*—Lieut.-Colonel M. O'Gorman, C.B., in the chair; Lieut.-Colonel W. A. Bristow; Lieut.-Colonel M. O. Darby, O.B.E.; Captain C. B. Wilson, M.C.

Air Ministry.—Major J. S. Buchanan, O.B.E.; Sqdn.-Leader R. L. G. Marix, D.S.O.; Wing-Commander S. W. Smith, O.B.E.; F. Tymms, M.C.

Society of British Aircraft Constructors.—Commander James Bird; H. Burroughes; H. T. Vane, C.B.E.

In Attendance.—H. E. Perrin, Secretary; B. Stevenson, Assistant Secretary.

Course.—Having received the reports on the aerial survey of various parts of the English Coast, the Committee came to the unanimous decision to hold the race in 1929 on the Solent.

SCHNEIDER RACE, 1929.

THE Royal Aero Club has received an entry of three competitors for the Schneider Race, 1929, on behalf of Italy. The entries close on January 1, 1929.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W.1.

H. E. PERRIN, Secretary

AIRISMS FROM THE FOUR WINDS.

Light 'Planes for S.A. Air Force

AN Avro "Avian" and a D.H. "Moth" have been used as an experiment for training cadets of the South African Air Force at Pretoria. The machines were flown from Cape Town to Pretoria by Major J. Holthouse, O.B.E., and Lieut. D. J. Roos. Should these experiments be successful more light 'planes will be acquired for training.

Spanish Airways

A MONOPOLY for air communications in Spain with a Government subsidy of £100,000, has been granted to a Spanish group formed for the fusion of the two companies now running air lines between Madrid, Lisbon, Seville and Barcelona. A Madrid-Paris air line, long desired, will now possibly develop.

Flight to West Africa

CAPT. R. S. RATTRAY, Provincial Commissioner, Gold Coast, who is flying back to Accra on his own D.H. "Moth" (Cirrus) is still detained at Le Bourget by bad weather. He left England on December 5.

Lady Bailey

THE French Government has advised Lady Bailey that it cannot give her permission to fly across the Sahara, for the purpose of which she has been waiting at Gao, on the Niger, for the last fortnight. The reason for the refusal is owing to the disturbed conditions. She has been advised to fly to Dakar and thence to Casablanca, a route where official facilities will be granted. Lady Bailey is flying her Cirrus-Moth.

Christmas Mail by Aeroplane

A POSTAL aeroplane with Christmas mail will fly to the Canadian North-West and distribute the mail over a distance of 1,300 miles to several hundred settlers who, ordinarily, would only have received it six weeks after its despatch from the nearest railway station.

Canadian Record

A NEW Canadian air mail record was made recently when

a machine left Montreal with 873 lb. of mail and flew 150 miles to Quebec City in 45 mins.

Anglo-Belgian Co-operation

SIR SAMUEL HOARE, Sir Sefton Brancker and Sir Alan and Lady Cobham are visiting Brussels this week to confer with the Belgian Minister for Air concerning co-operation in African air development.

Washington Conference Closed

COL. LINDBERGH received the Harmon Trophy at the International Civil Aeronautics Conference which closed at Washington on December 14. This is an annual award to the man who is considered to have done most for aviation during the year. Congress voted the D.F.C. to Mr. Orville Wright and also one to the name of his dead brother, Wilbur. The presentation to Orville was made at the celebration ceremonies at Kitty Hawk, North Carolina, this week.

German Air Disaster

A LARGE Luft-Hansa air liner crashed in a snowstorm between Berlin and Hanover on December 11, and the pilot, Capt. Doerr, and two others, forming the crew, were killed. The only passenger was saved, although he was fast asleep when the machine crashed. He awoke to find the nose of the machine in flames. Another passenger had previously disembarked at Hanover. Capt. Doerr was a war-time "Ace."

Hull and Aviation

ON December 7 Sir Sefton Brancker visited Hull to discuss with commercial men the proposal to establish an air port there. Maj. W. H. Carver, M.P., had asked Sir Samuel Hoare to send a deputation to the city, and he was informed that there was no hope of a subsidy being granted for any air service.

R.A.F. Boxers Win

THE Royal Air Force boxers entertained the Belsize B.C. at the Stadium Club on December 14. After a number of good fights the R.A.F. won by five events to four.



SIR ALAN COBHAM TRIES A NEW MOUNT : Sir Alan Cobham gave a fine exhibition of skilful piloting on the Simmonds "Cirrus-Spartan" at Croydon on December 11, in a high and very gusty wind. Sir Alan expressed himself as delighted with the airworthiness and "robust feeling" of the Spartan in the air

PRIVATE FLYING

A Section of **FLIGHT** in the Interests of the Private Owner, Owner-Pilot, and Club Member

THE LAW IN RELATION TO AIRCRAFT

As a subject for a book the law is not attractive reading as a rule other than to lawyers. In an effort to make it lucid it is usually expressed at inordinate length, involving inordinate repetition, and then it becomes obscure and elusive, except to a mind acutely alert and patient. A book on the law which we review here is out of that category altogether. Subjected to comparison, it is as clear and intelligible as a fairy story. The title is *The Law in Relation to Aircraft*, and the authors are Mr. L. A. Wingfield, M.C., D.F.C., and Mr. R. B. Sparkes, M.C., both Solicitors of the Supreme Court. Sir Sefton Brancker writes a brief preface.

Mr. Wingfield is well-known in the aviation community, particularly in connection with his work for the Institution of Aeronautical Engineers, now associated with the Royal Aeronautical Society.

This book is plain enough to be a practical guide, and its possession by all who fly regularly either as a civil pilot or a private owner-pilot will, it seems to us, be a precautionary measure. They should not go far wrong in a legal sense. Much of the information given will already be necessary, and familiar knowledge to those pilots who have passed for either flying licence, but that is not to infer that the book is primarily for those merely contemplating aviation.

As far as we can judge, the subject of law in relationship to flying is comprehensively covered, and the law does not stop as a dictator over those learning to fly. The wide freedom of the air can hide legal pitfalls. A pilot can easily trespass whilst in the air, although possessing no desire to infringe upon anybody's legal rights. Legally the air does not belong to everyone, because an owner of land also owns the space above it and the earth beneath the surface, so that strictly speaking an airman always trespasses every time he flies away from the boundaries of his own aerodrome, no matter what altitude he chooses.

A Roman law decreed in favour of the owner, and the common law has since been based upon that, although a subsequent qualification was accepted which declared that the owner could not prohibit interferences taking place at such an altitude that he or his land were not affected. This also applied to the earth beneath the surface. The point has been quite a serious legal question, however trivial and ridiculous it may seem. Aircraft do not aggravate the point, though, unless they intrude by landing. Before the days of flying there were petty actions in the courts in which imaginative judges or counsel considered the legal position of a future flying machine as a parallel to a case of trespass over space. For example, a man sued his neighbour for trespass because a board from the latter's house overhung the other's land.

The judge remarked that if that was trespass then every aeronaut would be liable for action by the owner of every field he flew over. And he (the judge) did not approve of that. But a later legal observation on the judge's opinion expressed understanding of its good sense, but not of its legal reason.

Stunting Exhibitions by Women

Miss DULCIE EVANS and Miss Marjorie Douglas, both South African pilots, gave a simultaneous display of stunting at Johannesburg recently. They looped and rolled together and also performed the falling leaf and stalled turns—according to a local report. Another exhibition was given by Mr. Will Hay, the comedian and private owner-pilot, who is now making a theatrical tour of South Africa. He was the guest of the Johannesburg Light Aeroplane Club. The local agents of the De Havilland Aircraft Co. are placing a D.H. "Moth" at his disposal during his tour.

Yorkshire's Club Dance

THE Yorkshire Aeroplane Club will hold a dance on January 18 in the Riley-Smith Hall, Tadcaster. Dancing will be from 8 p.m. to 2 a.m. The tickets are 12s. 6d. each.

The Air Navigation Act of 1920, however, which primarily applies to the British Isles, though it can be extended to British possessions other than our Dominions, provides that no action can be taken to aircraft on the score of trespassing in the air, if the flight is normal.

Action becomes liable in the case of damage when landing or taking off, even though there is no proof of negligence. But if the owner of the land is in any way responsible for the crash of the machine then he is not entitled to damages. The owner of the aircraft is always responsible for damages when there is no question of the landowner having thus contributed, but if a pilot is flying a machine which he has hired for more than fourteen days then he is regarded as the owner by the law, unless he is employed by the real owner.

Dangerous flying involves the owner of the machine as well as the guilty pilot unless he can prove that he was not at fault.

There is a part of Mr. Wingfield's and Mr. Sparkes' book which we would take the liberty of quoting in full as it bears on the current question of the possible overcrowding of airways and the danger of collision. There was a recent discussion on the question at which it was pointed out that private aircraft were crowding on the airways more and more.

The amended Consolidated Order declares the following rules under Schedule IV:

(a) Every aircraft when flying by compass along the straight line (rhumb line) joining two points on an air traffic route in common use, shall keep such line at least 500 yards on its left.

(b) Every aircraft following an air traffic route, which has been officially recognised, shall keep such route at least 300 yards on its left.

(c) Every aircraft which, in the vicinity of a route frequented by aircraft, is following a line of landmarks such as a road, railway, river, canal, or coastline, etc., shall keep such line of landmarks at least 300 yards on its left.

(d) An aircraft shall not fly keeping any of the lines or routes above referred to on its right except at a distance therefrom sufficient to avoid aircraft following such lines or routes in accordance with these rules.

(e) When crossing one of these lines or routes above referred to, an aircraft shall cross it at right angles as rapidly as possible and as high as reasonably practicable.

The law also warns airmen that when flying over towns the machine should always be at an altitude sufficient to enable it to be landed outside the city, and no stunting is lawful at public events like sports meetings unless the promoters of the events have first obtained permission. In conclusion, we can repeat that this book on aircraft law is justified as a necessary guide. It is published at the reasonable price of 12s. 6d., by Messrs. Longmans, Green & Co., and it is the size of an ordinary novel, which means that it is convenient for carrying in a machine. It is certainly not a volume to lie for ever in the library.

A Bute Aerodrome?

THE Rothsay Town Council has taken up the consideration of establishing a local aerodrome following the general Air Ministry appeal. It is stated that the Corporation owns a farm on the western uplands which would make an ideal site for an aerodrome.

Lady Heath

ON December 13 Lady Heath was presented to the House of Representatives at Washington. She was the only woman delegate at the International Air Conference there.

Irish Aero Club

CAPT. CROSSLEY has been chosen as instructor to the Irish Aero Club, and the following flying rates have been decided upon: Pilot members, 30s. per hour; Passenger members, 7s. 6d. Club secretary, Mr. G. Finlay-Mulligan.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.
Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Major G. S. Cooper, Filton Aerodrome, Patchway.
Cinque Ports Flying Club, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.
Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.
Lancashire Aero Club, Woodford, Lancs. Secretary, F. W. Atherton, Woodford Aerodrome, Cheshire.
Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, Capt. Ellis, Hooton Aerodrome.
Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Major Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, J. T. Dodds, Cramlington Aerodrome, Northumberland.
Norfolk and Norwich Aero Club, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.
Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria St., Nottingham.
The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, Harry W. Smith.
Southern Aero Club, Shoreham, Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.
Suffolk Aeroplane Club, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.
Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

REPORT for week ending December 16.—Instructors: Capt. V. H. Baker M.C., A.F.C.; Capt. F. R. Matthews. Ground engineer: C. Humphreys. The following machines were in commission during the week: G-EBMP, G-EBXS. Total flying time for the week, 11 hrs. 5 mins.

Dual Instruction:—Seven members received dual instruction during the week, the time being 4 hrs. 45 mins.

Solo Flying:—Ten members flew solo during the week, the time being 6 hrs. 20 mins.

On the 14th inst. D. T. Bennett completed the tests for his aviator's certificate.

Shed Accommodation:—The Club has now taken over the new shed for the accommodation of the machines. The shed provides ample room for the Club aircraft and also a very excellent engine repair shop.

Members' Room:—The members' room, bar and kitchen are well on the way to completion, and the House committee are now busily engaged in arranging for the necessary equipment. Luncheons and teas will be provided daily. It is hoped that these facilities will be available to the members, commencing the first week in January.

Christmas Ground Staff Fund:—The Christmas Ground Staff Fund has reached nearly £30. Members are reminded that the individual donation is limited to 10s.

BRISTOL & WESSEX AEROPLANE CLUB, LTD.

REPORT for the week ending December 15.—Pilot instructor for the week: E. B. W. Bartlett. Ground engineer for the week: A. W. Webb. Machines in commission: 2, G-EBTV and G-EBYH. Flying time for the week: 8 hrs. 15 mins. Pupils under instruction (4): 4 hrs. 5 mins. Soloists under instruction (1): 2 hrs. 30 mins. "A" pilots flying (3): 1 hr. Test flights (5): 35 mins.

Our members have made the most of their few opportunities this week. Mr. Rogers satisfactorily passed his test for the Royal Aero Club Certificate with a very polished exhibition of flying.

We regret to state that two of our members, ex R.A.F. pilots, have been reported to the Flying Committee for low flying in contravention of Club Aerodrome rules, and have been suspended from flying Club machines for periods of one and three months.

CINQUE PORTS FLYING CLUB

REPORT for week ending December 15.—Pilot instructor: Maj. H. G. Travers, D.S.C. Ground engineer: Mr. R. H. Wynne. Machine: N.N. Flying time for the week, 6 hrs. 15 mins.

Dual Instruction:—Mr. Clemetson, 30 mins.; Mr. Evernden, 15 mins.; Mr. Worsell, 15 mins.; Mr. Swinnard, 30 mins.; Mr. A. Payn, 15 mins. Total (five members), 1 hr. 45 mins.

Soloists under instruction:—Mr. Hamilton, 1 hr. 15 mins.; Mr. Worsell, 15 mins.; Mr. A. Payn, 2 hrs. Total (three members), 3 hrs. 30 mins. "A" Pilots:—Mr. Hamilton, 30 mins. R.A.F.O. (unlicensed):—Mr. Tomkins, 15 mins.

On Sunday, December 9, Mr. Hamilton, an officer in the R.A., completed his tests for "A" licence in good style. He was sent to the Small Arms School, Hythe, on a three weeks' course, and it is gratifying to find that we can put through officers on such short courses in the depth of the winter.

On Friday, December 14, Mr. Armstrong Payn, of Deal, also completed his tests, and his landing with engine off from 5,000 ft. to within about 15 yards of the mark was exceptionally good.

Fog stopped flying on Wednesday, Thursday and Saturday of this week. The club-room inside the hangar is gradually getting furnished, and it is hoped to have the bar in full working order over Christmas.

Arrangements have been made to take over an X-type Moth G-EBRI, in place of the Vicomte de Sibour's Moth S.S., formerly the property of the Club. The machine R.I. belonged to the Duchess of Bedford and was flown for her by Capt. Barnard. Maj. Travers and Mr. Thwaites will take delivery at Stag Lane on Sunday, the 16th. It is hoped that the club will have both machines, N.N. and R.I., in commission during the Christmas holiday.

HAMPSHIRE AEROPLANE CLUB

REPORT for week ending December 15.—Pilot instructors: F. Lt. F. A. Swoffer, M.B.E., and Mr. W. H. Dudley. Ground engineers: Mr. E. Lenny and Mr. J. Elliott. Aircraft: D.H. 60 Moths G-EBOL and G-EBOH and Avro Avian G-EBVL. Flying time for the week: 17 hrs. 15 mins. Pupils under instruction (12): 4 hrs. 30 mins. Soloists (2): 1 hr. 20 mins. "A" pilots: (11): 10 hrs. 5 mins. Passengers (2): 30 mins. Tests (7): 50 mins.

Two new pilot members have joined us this week, Miss Joyce Pike and Mr. G. Villiers.

We are pleased to have our Avian machine back looking like new again. After Miss Grace's crash at the end of August last, it was sent to the Henderson Flying School for repairs and Col. Henderson himself flew the machine back on Thursday. Given flying weather, we hope to add considerably to our flying time.

For the information of those members who have not recently visited the Club, we should like to point out that the Staff Christmas Fund is open. The Club will be closed for Christmas Holidays from Sunday, December 23rd, to Friday, December 28th, both days inclusive.

HOUSEHOLD BRIGADE FLYING CLUB

REPORT from October 1 to December 11.—Total dual: 14 hrs. 15 mins. Solo: 29 hrs. 55 mins. Dual instruction (Brooklands): W. T. d'Eyncourt, 3 hrs. 45 mins.; E. L. Donner, 20 mins.; Capt. P. Ellison, 40 mins.; A. V. Douglas, 30 mins.; R. L. Preston, 1 hr. 10 mins.; H. R. Norman, 10 mins.; Capt. A. d'Eyncourt, 3 hrs. 10 mins. Solo: L. Guinness, 15 hrs.; T. Bellville, 30 mins.; R. Quilter, 55 mins.; Capt. A. d'Eyncourt, 3 hrs.

Dual instruction (Lympne): E. Somerset, 3 hrs. Packenham, 1 hr. 30 mins.

Solo: A. V. Douglas, 4 hrs. 45 mins. R. West, 5 hrs. E. Somerset, 45 mins.

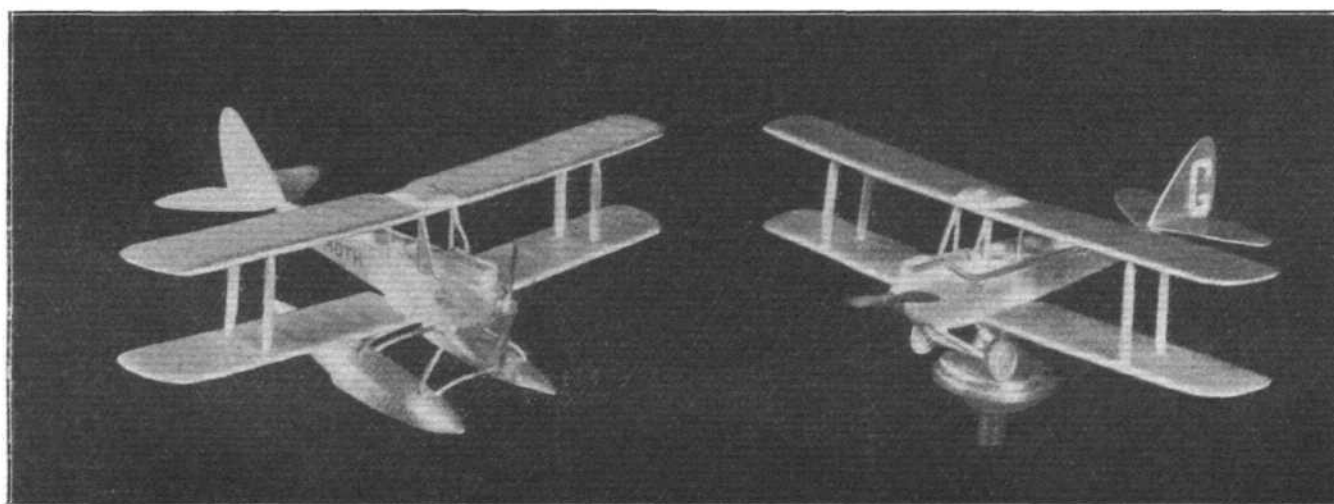
"A" Licences: The following have obtained their "A" Licences: A. V. Douglas, R. West, L. Guinness, R. Quilter, and Capt. A. d'Eyncourt.

L. Guinness has purchased a half-share in a Mark II Moth, G-EBVK. Speed record: A. S. Butler, who is a member of the committee of the Household Brigade Flying Club, recently established a speed record in his Moth aeroplane, with Mrs. Butler as passenger.

Membership: The membership of the Club is now 72, a new member is Capt. The Rt. Hon. F. E. Guest, P.C., C.B.E., D.S.O., M.P., late of the Life Guards.

LANCASHIRE AERO CLUB

REPORT for week ending December 15.—Flying time, 15 hrs. 35 mins. Instruction (6), 3 hrs. 25 mins.; solo flights (9), 9 hrs.; passenger flights (7), 1 hr. 45 mins.; tests (9), 1 hr. 25 mins.



"MOTH" MOTOR MASCOTS: Our picture shows two realistic models of the D.H. "Moth"—a sea-plane and a land plane—intended for use as motor mascots. They are made by the Birmingham Medal Co., the well known Medallists and Silversmiths of Birmingham.

Instruction (with Mr. Hall):—Meads, R. G. Davies, Russell, Whitehouse, Eckersley, Foote. Machines in commission: XD, PH, MQ, QL.

Soloist (under instruction):—Eckersley.

Pilots:—R. F. Hall, Lacayo, Mills, Meads, Harrison, Gattrill, Goodfellow, D. Nelson.

Passengers:—(With Mr. R. F. Hall) R. G. Davies, Hartley, Miss Smith; (with Mr. Lacayo) A. Benson; (with Mr. Michelson) Miss Herd; (with Mr. Cantrill) Machin, Miss Booth.

The aerodrome and clubhouse will be closed for the Christmas holidays from the evening of Sunday, December 23, reopening on Saturday morning, December 29. The aerodrome will also be closed as usual, Monday, December 31, but will be open on New Year's Day.

A rather amusing item has come to light in connection with Mr. Gort's cross-country flight to Hooton, in the course of which he lost himself and landed at Sealand. He was following Mr. Chapman on another Avian, and about half-way to Hooton discovered that the other machine was rapidly drawing away from him. By flying at almost full throttle he succeeded in keeping it in sight for the next 15 miles, and it was only after following it down and landing that he discovered that he was at Sealand and that the machine which he had been chasing was a Siskin. (Nothing is being paid by Messrs. A. V. Roe and Co., Ltd., for this advertisement.)

OVERSEAS CLUBS

SINGAPORE FLYING CLUB

REPORT for week ending November 10.—Total flying time: 19 hrs. 55 mins. Solo: 45 mins. Dual instruction: 7 hrs. 50 mins. Air experience: 8 hrs. 40 mins. Joyrides: 1 hr. 30 mins. Tests: 10 mins. Special flight: 1 hr.

On 7th instant, the "Spirit of Australia," in which Capt. Hurley, Flt./Lieut. Moir and Flt./O. Owen are attempting to fly from Australia to England and back in 28 days, arrived and alighted on the racecourse. It was found that it would be impossible to take off from there fully laden, so Flt./Lieut. S. H. Gaskell flew Flt./Lieut. Moir to Seletar in one of the Club machines, in order that the pilot of the "Spirit of Australia" might have a look at the Aerodrome at the air base. On his return, Flt./Lieut. Moir took the "Spirit of Australia" off from the racecourse unladen and alighted at Seletar. On the following morning, the machine got away without difficulty and the latest reports are that Victoria Point was safely reached.

On 6th instant, P. T. Hutchings made his first solo flight.

On 9th instant, we were pleased to be able to welcome the Club Captain, R. Johnstone, on his return from leave in Australia.

[NOTE.—Owing to extra pressure on our space this week, further Club reports have unavoidably been held over until our next issue.—ED.]

PARACHUTING

ONE of the experiences in life that very few of us knock people over to encounter is to drop out of an aeroplane with a parachute, yet, like most of the untried experiences of the ordinary man, it is nothing like the excruciating sensation that he imagines. This ought to be appreciated by reading the following straight-forward, involuntary story by a Royal Air Force officer of his unpremeditated descent some time ago with an Irvin parachute or "air chute" in England.

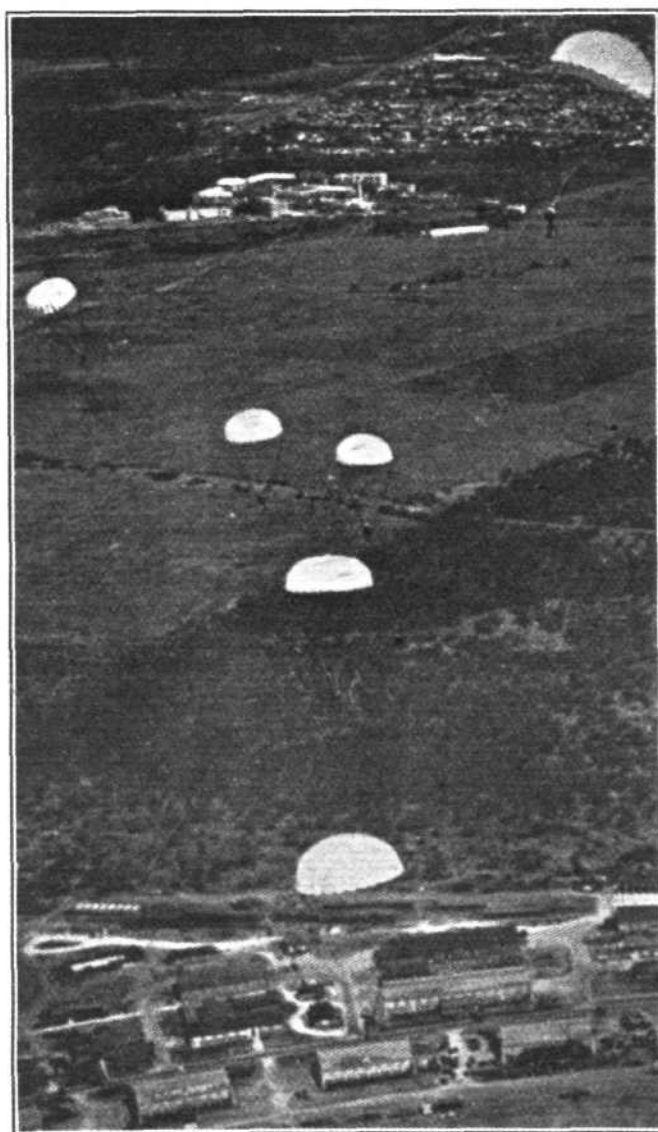
"I was flying an Armstrong-Whitworth 'Siskin IVA' at about 2,000 ft. when I undid my safety belt to pick up a map that had fallen to the bottom of the cockpit. While I was leaning forward the aeroplane commenced a dive which rapidly went beyond the vertical, the result being that I was thrown out. I found myself lying with my face towards the sky and my feet slightly higher than my head. I experienced no sensation of falling, in fact the only indication of any movement I had was the pressure of air from behind me. It was not long before I thought of my parachute and then I immediately commenced to try and find my rip cord ring. I found I could move my hands all right but had more difficulty in bending my head to see where the ring was.

"This may have been due to the natural stiffness of the Sidcot suit I was wearing, or else to the fact that by now my feet being considerably higher than my head, the muscular movement was greater. At any rate, I had little difficulty in finding the ring even without seeing it, and immediately pulled it. I could both feel and see the parachute as it left the pack and whisked past my feet, but that is barely more than an impression since it was almost simultaneous with the pulling of the ring that I felt the jerk that pulled me the right way up. I should estimate my height at about 1,500 ft. when the parachute opened and at that height I appeared to be stationary. I took the opportunity of looking around to try and see my aeroplane, but it seemed to have entirely disappeared. I was rather worried in case it had fallen on a building or had hurt anyone. As I approached the ground I became more conscious of my speed of descent and also I discovered the direction in which I was drifting. I managed to turn so that I was facing the direction in which I was moving. During this latter part of the descent only two things worried me; one was that I appeared to be approaching a large tree that bordered a field in which I was obviously going to land; and the other was that I had been told that landing in the service type parachute was considerably heavier than landing in the type with which we did our practice jumps. Both these fears, however, proved to be unnecessary, since I cleared the tree by several feet and eventually landed in the middle of the field entirely unhurt. On enquiring of a farmer who rode up, I learnt that my aeroplane had crashed about a mile away, hitting some trees but luckily otherwise doing no damage." Another parachuting experience, this time in America, is equally interesting. Part of the training of the American Air Service cadets at the Primary Flying School at Brooks Field, San Antonio, Texas, where Col. Charles Lindbergh passed through during his cadet training, is parachute jumping. Jumps are often made by groups of six or seven pupils, as our illustration shows, and from an altitude of about 2,000 ft. It is enjoyed by most cadets, but an adventure which befell one of them recently was disturbing. He had stepped from a machine at 2,000 ft., counted five, pulled the release ring, and awaited the usual opening. This duly occurred and checked the drop, but instead of gliding safely to earth, he suddenly became aware of rising, and to his alarm, he actually went up above his own machine! This

travel in the wrong direction was but momentary, however, and a very slow descent to earth soon followed. It had been due to a strong upward rush of air catching the canopy as it opened.

According to tests conducted at the Air Corps Experimental Engineering Station, at Dayton, Ohio, the normal rate of descent with a parachute from an aeroplane flying from 800 to 1,000 ft. varies between 18 to 27 ft. per second. The rate of descent of the pupil mentioned was only 3 ft. per second, the slowest rate ever recorded for a parachute descent.

The American Air Services use Irvin parachutes.



American Air Services cadets practising simultaneous parachute jumps at San Antonio, Texas. Irvin parachutes are standard equipment in the American Air Services.

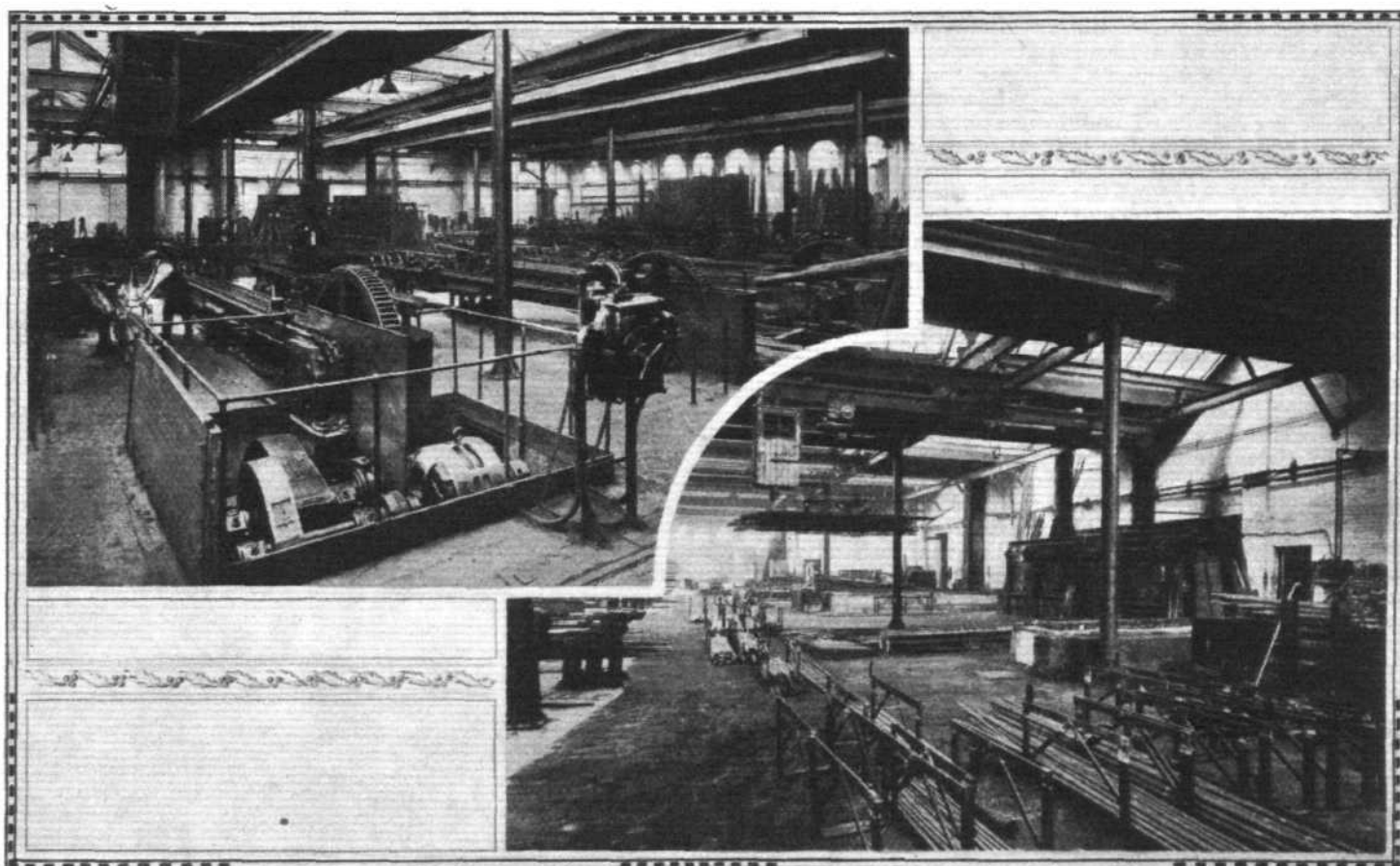
SOLID DRAWN TUBING FOR AIRCRAFT

Metal Construction Facilitated by Tube Manufacturers' Art

BROADLY speaking, it may be said that in the process of development of all-metal aircraft construction which has resulted from the Air Ministry's decision to insist on replacing wood by metal, British aircraft firms have become divided into two "schools" one of which has decided to make use, wherever possible, of structural members formed from metal strip into a number of different sections, while the other has elected to make the fullest possible use of metal in tubular form, readily obtainable from old-established firms with a quarter of a century's experience in the production of metal tubes. It would be extremely difficult to express an opinion, even were it desirable to do so, as to which of the two "schools" is following the better policy, if indeed there is much to choose between them. The subject is one of considerable complication, and it would appear that ultimately the final decision should be largely governed by considerations of mass production at a time of emergency. In the case of the firms which rely mainly upon sections formed from strip, a larger and

It is, perhaps, doubtful whether many general users of steel tubing have ever stopped to consider the actual extent to which they are indebted to the maker of the tubing. A piece of steel tubing is apt to be regarded—well, simply as a piece of steel tubing, or even as "a piece of gas piping." How much care has gone into its manufacture from the time it started life as a "bloom" until it is despatched to the user is a question which probably few have troubled to ask. Yet the art of tube manufacture is by no means an easy one, and requires very specialised knowledge and experience.

Among British tube manufacturers who have been producing steel tubing for bicycles, motor cycles and motor cars for more than a quarter of a century, and who have now seriously laid themselves out to cater for the very special and difficult requirements of aircraft constructors, few can claim a better record than the Reynolds Tube Company, Ltd., of Tyseley, Birmingham. It is now more than 25 years ago that this firm introduced the special patented "butted



IN THE HAY HALL WORKS OF THE REYNOLDS TUBE COMPANY AT TYSELEY, BIRMINGHAM : Above, some of the large drawbenches. Below, the annealing and pickling plant.

more expensive plant is required, but the supply from outside the actual works is confined to the strip used. On the other hand, the aircraft constructor who prefers to use solid drawn tube for the majority of his structural members requires but a relatively small plant, but relies upon the tube manufacturer to supply his material.

In describing metal aircraft recently we have dealt, perhaps, more extensively with strip construction than with tube. This is not because we necessarily regard the former as being the better type, but is merely a result of circumstances, it having happened that such machines as have become available for detail description and illustration have chanced to employ mainly strip construction. Tubular construction is, however, becoming very popular also, and the raising by the Air Ministry of the ban on welding will doubtless do much to increase this popularity, although naturally the use of tubing in aircraft construction is by no means confined to metals which can be welded.

tube" joint which later became so extensively used in the construction of bicycles. This so-called butted or reinforced joint makes use of a gradual thickening of the actual walls of the tube end, thus overcoming the weakness that arises when a plain tube is slipped over a hollow plug end. The change of section becomes gradual instead of sudden, and fracture at this point is avoided. Perhaps it would not be entirely incorrect to ascribe to this early beginning the later greatness of the House of Reynolds, for much of their subsequent work has been connected with the production of single or double butted tubing and taper gauge tubing. In fact, a visit to the Tyseley works indicates that there is practically no end to what can be done with steel tubing. Tubes tapering in diameter and thickness, tubes of all manner of sections, straight tubes and tubes bent to the most weird shapes, are to be found in huge quantities in the large stocks always carried by this firm. Some of the tubular parts for motor cycles, for instance, give one the impression that the

designer merely drew something which looked easy on paper, and then simply left it to Reynolds to solve the manufacturing difficulties—which they appear to have done in the most convincing manner.

While much might be written about the production of tubing for road vehicles, it is with the manufacture of special aircraft tubing that we are here concerned, and as it happens, this type of tube is also very much more difficult and therefore more interesting.

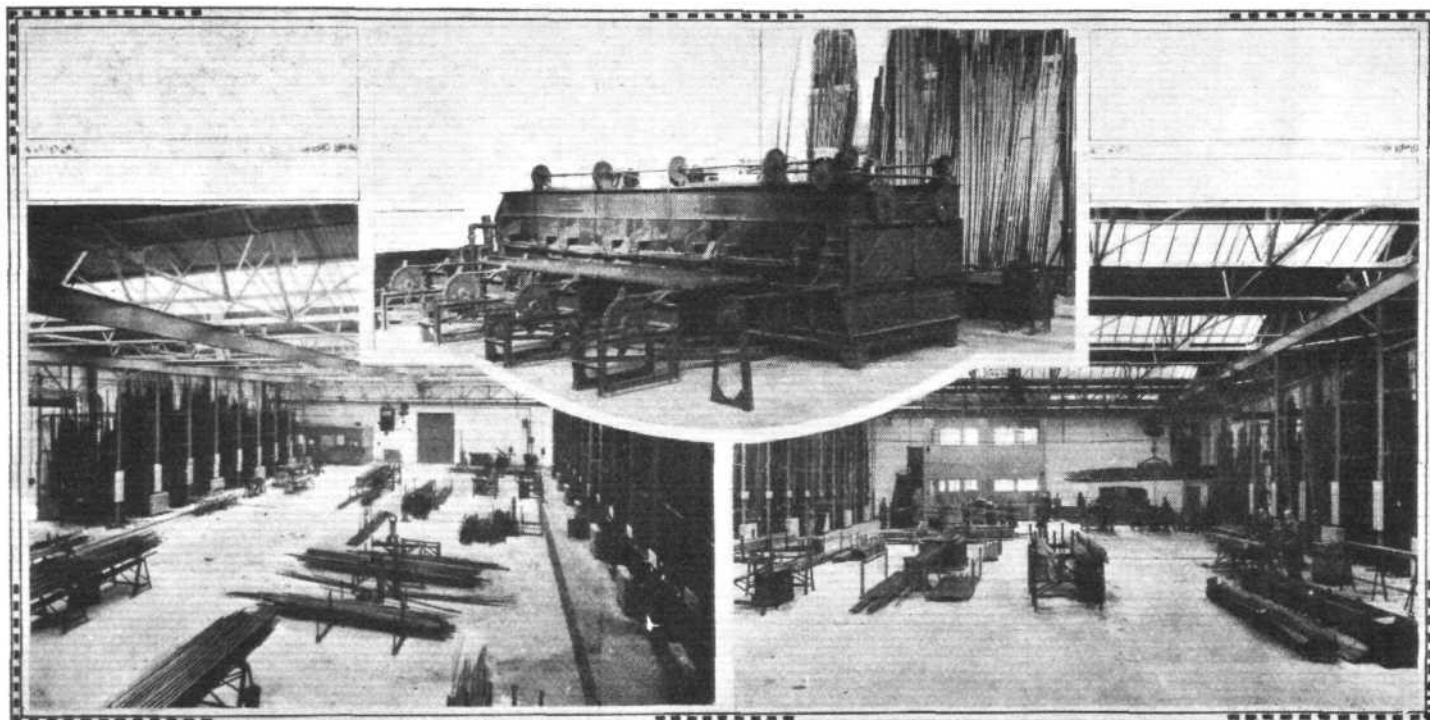
The Reynolds factory at Hay Hall, Tyseley, was erected during the war under the direction of the Air Ministry for the production of aircraft tubing, on which class of tubing Reynolds had no less than three works engaged. After the war, the other works were concentrated at Tyseley, where the firm now has an area of about nine acres and works equipped with the most up-to-date plant for the manufacture of weldless steel tubing of the very highest quality.

It was through the new Tyseley works that we recently had the pleasure to wander with Mr. Austyn Reynolds, the firm's Technical Director, as our guide, and the views which accompany these notes illustrate but a few corners of the very extensive works. In the space available, we cannot hope to give a comprehensive review of all the vast activities of the firm, but if we confine ourselves to some of the work on aircraft tubing, we shall at least have dealt with what is

industries have been producing less, these figures give a good indication of the extent to which tubular construction has developed during the last two years. It goes without saying that this great expansion of the aircraft side of the Reynolds' works has necessitated the installation of a great deal of new equipment, and increased warehouse accommodation for stocking the more usual sizes of tube to all specifications under the best conditions.

The increasing demand for aircraft tubing also meant installing a special heat-treatment plant of up-to-date design, and increased accommodation for inspection and testing. But realising the great future which metal aircraft construction undoubtedly has, the Reynolds Tube Company has not hesitated to lay down the necessary plant, so that now the firm is in a position to supply at short notice all the more standard sizes and specifications. In the colonies also, an increasing amount of business is expected, and agents and stockists have been appointed so that colonial constructors may obtain their supplies with a minimum of delay. It might be mentioned in this connection that Reynolds' agents in Australia are the Larking Aircraft Supply Co., Ltd., while in Canada, F. Bacon & Co., Ltd., of Montreal are the agents.

Perhaps one of the most difficult, and for that reason one of the most interesting, examples of metal aircraft work of recent times is provided by the rigid airship R.101, in which



IN THE REYNOLDS AIRCRAFT TUBE DEPARTMENT: Above, the special heat treatment furnace which is heated by town gas, and the temperature of which can be controlled within 5 deg. C. along the entire 20-ft. length of furnace. Below, two views in the new aircraft tube shop.

undoubtedly the most difficult branch, and our readers may take it for granted that if this exacting work can be successfully undertaken by the Reynolds Tube Co., Ltd., the simpler class of work is not likely to present any difficulties.

Plain circular section tubes have been used for a number of years in aircraft construction, as have now also such simple sections as oval and "streamline." Of recent years, however, other forms have been demanded, and much more important still, steels of a very different specification are required, which, in the very nature of things, are much more difficult to manipulate. Steel tubes which "started life" as circular sections, have now successfully been turned into special sections, such as flat-sided or square tubes with rounded corners, kidney-shaped sections for cowling rings, tubes forming sections resembling an open double figure-of-eight, "D" sections, and so on. Square sections with sharp corners are also manufactured, and all these various sections are obtainable in a wide range of gauges, and in various classes of steel.

As an instance of the way in which the Reynolds Tube Company has developed its aircraft section, it may be mentioned that two years ago, aircraft tubing constituted but 5 per cent. of the firm's total output. During the last three months, this percentage has risen to 40. As there is no reason to suppose that the cycle, motor cycle and motor-car

a good deal of solid-drawn nickel chromesteel tube has been used. Some aeroplane constructors are now using similar tubing for highly-stressed parts, and a few words concerning it may, therefore, be of interest.

In the R.101 these tubes are used chiefly as the base members of the longitudinals, and in the largest sizes for the fin and rudder posts. The sizes used range from 1 in. by 14 gauge to 2½ in. by 20 gauge, there being many intermediate sizes, of which the greater portion are 2½ in. by 21 gauge. The smaller and thicker tubes call for no special comment, as the manufacture and heat treatment presented no particular difficulties. The sizes of most interest are the 2½-in. by 21 gauge, and the 2½-in. by 20 gauge, these being the thinnest solid-drawn tubes used in such sizes.

The actual manufacturing processes employed were similar to those in normal use by the Reynolds Tube Co., although the intermediate heat treatment between drawing called for special attention in the case of the nickel chrome steel. The tubes were drawn on solid bars and not, as is more usually the case, over a fixed plug. This method was found to permit of a greater reduction at each "pass" without fear of fracture, since the friction on the inside of the tube was reduced to a minimum.

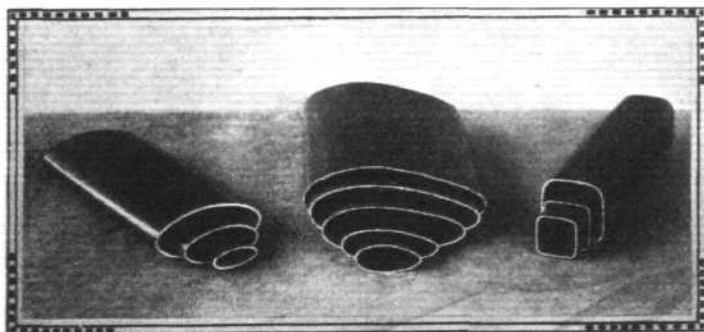
The hardening and tempering of these tubes presented many difficulties, not least because the most difficult of all, i.e.,

the 2½-in. by 20 gauge, were required in 13-ft. lengths in many cases. Probably the ideal method would have been a vertical furnace from which the tubes could either be lowered or raised for air hardening, but the expense of such a furnace, capable of a temperature of 850° C., would have been prohibitive, and consequently other means of preventing distortion had to be found.

The furnace already available, which was specially designed for blueing and heat treatment of tubes to aircraft specifications, is heated by coal gas and has a mechanical side feed and discharge apparatus along its entire length of 20 feet.

From the very beginning it was found that the tubes assumed an oval shape if heated to 850° C., while stationary on the floor of the furnace, and that the charging apparatus damaged the tubes when discharging for air hardening. The difficulty was overcome in the following manner. The charging apparatus was dismantled from the furnace, leaving a level carborundum floor, over which the tubes were rolled one at a time by two men equipped with hooked rods threaded in each end of the tubes. It took from five to ten minutes for the tubes to attain a temperature of 850° C. They were then lifted by means of the hooked rods and immediately placed on the level floor near the furnace and continuously rolled until cold. By this method the tubes were kept reasonably straight and comparatively round.

In order to obtain the mechanical properties required (65-ton proof stress) the tempering was done at 400° C., after which the tubes were rolled on the furnace floor as before. The following dimensional limits were required: straightness within 600/length and round within ± 2 per cent. of the diameter. The roundness was obtained by very careful "reeling" and pressure. The straightening, however, was not so simple, as the tubes usually took a fairly sharp set near the ends. It was found that the tube collapsed before it could be straightened, and to overcome this difficulty it was necessary to load the entire tube with resin, which when cool resisted the crumpling effect of straightening. After straightening, the resin had to be melted out, but occasionally difficulty was experienced by the resin catching fire and in



Three forms of Reynolds Aircraft Tubing in various sizes: Oval, streamline and square sections.

effect tempering the tube below the required strength. In such cases the whole process of hardening, tempering, loading and straightening had to be done again.

Thanks to the long experience of the Reynolds' Tube Company, many of the difficulties first encountered have been overcome, and the production of such tubes as a commercial possibility is in sight. Needless to say, however, the cost of the operations must necessarily make the price of such tubes high.

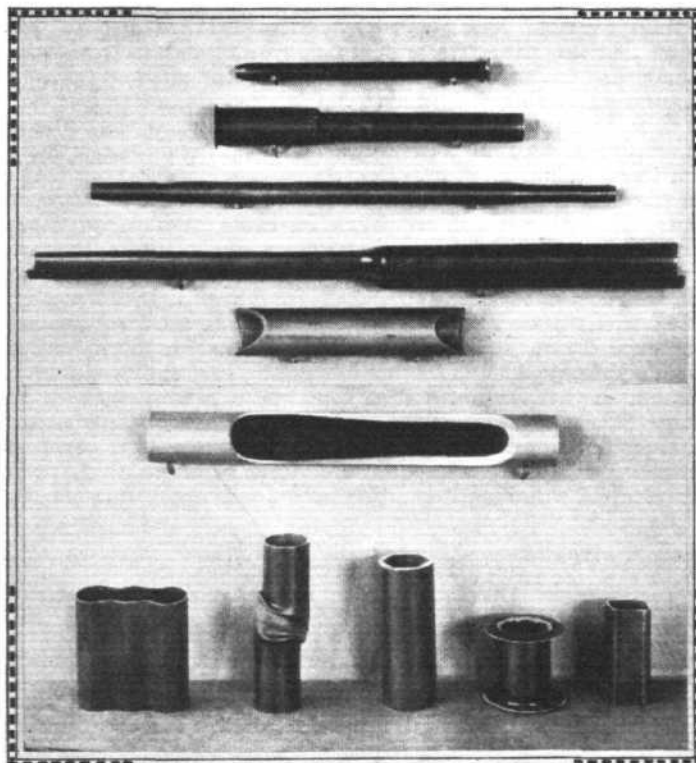
Some two years ago tubes were produced experimentally from steel having a higher manganese content than is usually employed in plain carbon steel for the manufacture of tubes.

Two steels, both containing 1.5 per cent. manganese, but with varying carbon content, were used, the one having a maximum carbon content of 0.50 per cent. and the other 0.30 per cent.

The steel usually employed for the manufacture of seamless tubing contains about 0.60 per cent. manganese with a carbon range from 0.15 per cent. to 0.55 per cent., according to the mechanical properties required. Since the effect of manganese in a steel is much the same as carbon, superior mechanical properties can be obtained. Reckoning on the fact that for each 0.01 per cent. of manganese present the tensile strength is increased by 200 to 400 lbs. per square inch, it will be seen that to increase the manganese content from 0.60 per cent. to 1.5 per cent. will increase the tensile strength by approximately eight tons per square inch.

Take then a steel containing a suitable carbon content for welding, which the Air Ministry put at 0.30 per cent. maximum, and increase the manganese content to 1.5 per cent., we have a tube giving mechanical properties equal to B.E.S.A.

Specification T.5, without in any way detracting from its welding properties. As a matter of fact, the higher manganese content has improved the welding properties of the steel, since the presence of manganese prevents the formation



Some special forms of Reynolds Tubing

of iron oxide during welding, as well as slightly reducing the melting temperature of the steel.

The latter point is an important detail with which users should acquaint their welding operatives, since the art of good welding is not to overheat the metal. It will, however, be quite apparent when welding that this steel does flow more readily than the usual low carbon steel.

It is desirable, though not essential, that the "feed," and also other tubes and fittings being welded, are of the same chemical composition, the material now being obtainable in the form of sheet, strip and wire.

Tubes made from this steel are now covered by Air Ministry Specifications D.T.D. 89 A and D.T.D. 113. Tubes to the original Specification D.T.D. 89 are now divided into two classes. Specification D.T.D. 89 A covers all round tubes down to and including ½-in. diameter, whilst D.T.D. 113 covers all non-circular tubes, and round tubes below ½-in. diameter.

The following table gives the comparative tensile strengths of these specifications compared with Specification D.T.D. 41, which had previously been the only specification for steel tubes suitable for welded structures.

Specification	Tensile before welding (tons per sq. in.)		Tensile after welding (tons per sq. in.)
	Yield	Break	Yield
D.T.D. 41	28	30	17
D.T.D. 89 A	40	45	25
D.T.D. 113	30	35	

It will be seen that the yield in tension after welding is 32 per cent. higher for the two new specifications.

These new specifications have now been adopted as standard by some aircraft constructors, the quantity of tubing supplied up to date being approximately a quarter of a million feet.

The other steel containing 0.50 per cent. carbon with 1.5 per cent. manganese is covered by D.T.D. 91 Specification, including an alternative composition now being drafted by B.E.S.A. to take the place of the present T.5 specification, on which it shows an increase of strength of 5 tons per sq. in.

It is interesting to note that some of the first tubes to be made from this steel were used in the construction of the "nose" of R.101 by Messrs. Boulton & Paul, the size being 3½ in. by 17 s.w.g., and were required to have a yield stress in tension of 55 tons minimum. It can be seen, therefore, that there is ample margin of strength on this steel to fulfil Specification D.T.D. 91, which calls for a yield of 45 tons per sq. in.

A 3,500,000,000 CANDLE POWER SEARCHLIGHT

A SEARCHLIGHT of unusual dimensions has been designed and constructed by the London Electric Firm, South Croydon, Surrey. It is thought to be the largest in the world, and will be mounted at a Continental power fortress. In candle-power it is approximately 3,500,000,000, and it would be visible for hundreds of miles if the limitations of the horizon could be overcome and good weather prevailed. The diameter of this searchlight is nearly 7 ft., and its height is about 14 ft. when mounted on its trolley, which runs on narrow lines. There is so much space in the interior of the searchlight that a man can move about without restriction for cleaning and adjusting operations. Entrance is gained through a sliding trap-door which has, of course, to be made perfectly light-tight, like all other necessary apertures in the searchlight. The shutters behind the split mirror overlap when closed so that no light filters through.

The searchlight has an elevation angle of 90 degs. and is electrically controlled from a distant control mounted on a low trestle. The operator can even be miles away and yet control the signalling, with all its various directions and elevations. Alternatively, complete hand control is provided for, including close hand control and Pan handle control. Despite the size and weight of the searchlight, it answers to hand control smoothly and easily. Quick or slow motions of the beam are given in the first instance to enable rapid search for the object, then follow slow movements when once it has been located.

This distant control will mean more harmonious work for anti-aircraft crews. In addition to making these very large searchlights, the London Electric Firm also makes the smallest and all intervening sizes and types, both electric and acetylene. They include High Intensity, Army, Navy, Mercantile, Air Force, Suez Canal, Fire Brigade, Cinema Studio, Protective, Display (sale or hire), Pilot House, Aerodrome Floodlight, Fog Penetrating, and Skywriting.

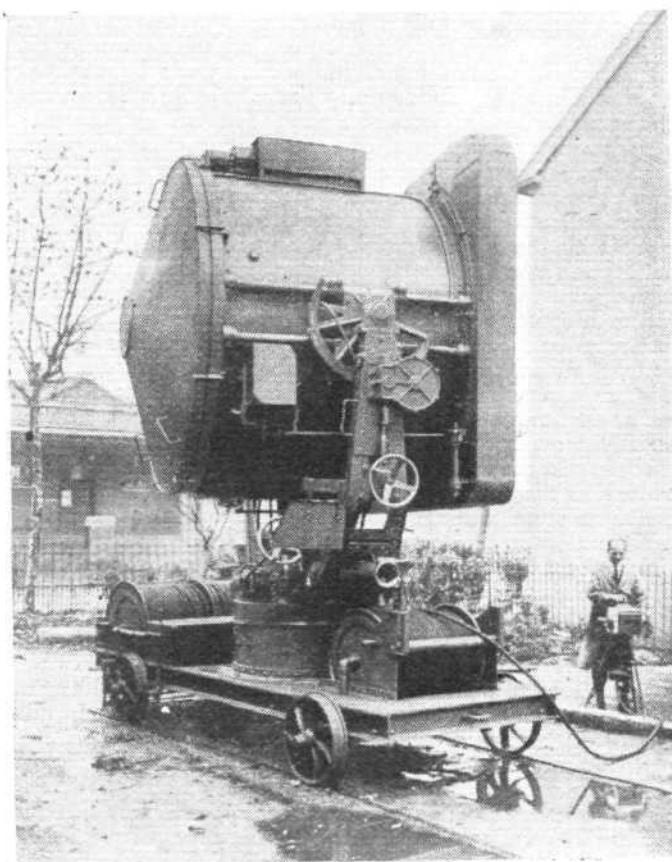
The Suez Canal Searchlight embodies the Sir Charles Parsons patent split mirror, giving dual beam for navigating the Suez Canal.

Those for cinema use are mounted on high pedestals and are movable from point to point. Combined Beacon Floodlights mounted on Caterpillar tractors are produced for aerodrome purposes.

An innovation in lamp suspension has also been designed and constructed. It is for use on tubular steel masts, and has been supplied to a Colonial Government wireless station.

In this design it was fundamentally essential to attach a lamp to a wireless mast in such a way as to leave it above the top of the masts as a warning signal to aircraft flying near

the masts and yet enabling it to be lowered to the ground for cleaning and maintenance without the lamp being unduly deflected in the process. In position the lamp is over 140 ft. above ground level.



The new 3,500,000,000 candle-power searchlight designed and produced by the London Electric Firm, South Croydon, which is the largest in the world. It is to be used on a Continental power fortress, and can be electrically controlled at a long distance or hand controlled.

Sqdn.-Ldr. Hinkler's Lecture

ON December 6 Sqdn.-Ldr. "Bert" Hinkler, A.F.C., D.S.M., lectured at the Royal Aeronautical Society on the technical aspects of his flight to Australia in the Avro "Avian" (Cirrus). We have dealt fully with his previous accounts of his flight in recent issues of *Flight*, so we here summarise a few new points that he brought out. On the sea stretch from Malta to Bengazi he found that the Royal Navy took an interest in all airmen making that passage and insisted on them reporting their departure, so that if they failed to arrive a naval search could follow. From Singapore he thought that the route to Australia was really intended for seaplanes or flying-boats. At Bima the only oil he could obtain was that laid by for the use of the Smith brothers for their Australian flight. In spite of its age, however, he had no trouble from its use.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the fund was held at Iddesleigh House on December 13. Lieut.-Comdr. H. E. Perrin was in the chair, and the others members of the Committee present were:—Mrs. L. M. K. Pratt-Barlow, O.B.E., Mr. W. S. Field, Sqdn.-Leader Douglas Iron, O.B.E. The committee considered in all 14 cases, and made grants to the amount of £256 4s. 6d.

Imperial Airways Christmas Services

IMPERIAL AIRWAYS, LTD., announce the following arrangements for their air services at Christmas—London-Paris-Basle, and London-Brussels-Cologne routes; Christmas Eve, December 24, all services as usual; Christmas Day, December 25, all services cancelled. Boxing Day, December

26, London-Paris-London, 2nd-class service cancelled; Basle-Paris-London service cancelled; Silver Wing and London-Brussels-Cologne return service as usual. December 27, New Year's Eve and New Year's Day, all services as usual. Air Mail: There will be no despatches from England to the Continent of either letter or parcel Air Mail on December 25 and 26.

Brochure of Great Flying-Boat Cruise

A BROCHURE in superior style of the Royal Air Force Far-East Flight has been issued by the Supermarine Aviation Works, Ltd., and D. Napier and Son, Ltd. In a large neat cover, R.A.F. blue in colour, is a set of coloured photogravures of the officers, the airmen, one of the Supermarine-Napier "Southampton's" flying between Akyab and Rangoon; the four machines at Singapore Air Base amid tropical beauty; and extracts from the diary issued by the Air Ministry. Finally, there is a coloured map of the long route followed to Singapore, Australia and back to Singapore. The brochure is a beautiful memento of a great cruise and the pictures will look well framed.

Sir Charles Wakefield Survey Flight

A WORTHY memento of the Sir Charles Wakefield Survey Flight round Africa in 1927-28, carried out by Sir Alan Cobham in the Short "Singapore" flying-boat, has been artistically prepared. The route flown is traced on a large map of the African Continent round which are photographs of Sir Charles Wakefield, Sir Alan Cobham, Lady Cobham and the crew, and of the "Singapore" flying-boat in different waters. Mr. Oswald Short pens a message on the map and the art cover enclosing it, thanking those who helped them in their pioneering endeavour in the cause of aviation.

THE STORY OF A NORTH SEA AIR STATION*

NOT very much has been published hitherto of the war work of the Royal Naval Air Service. Admiral Murray Sueter tells a good deal about it in his book "Airmen or Noahs" and "Pix" (Sqn.-Commander T. D. Hallam, D.S.C.), in "The Spider Web," gives a vivid and most interesting account of the doings of the Felixstowe station. Lieut. C. F. Snowden Gamble has now performed a similar service for the station of Great Yarmouth. His book, however, has a far wider scope than that. He outlines the general history of the Royal Naval Air Service from its formation until the end of the war, by which time it had been merged in the Royal Air Force. The drawback to this method is that the reader would imagine that the R.N.A.S. was concerned entirely or mainly with the North Sea. The work on carriers is touched on here and there, but the Channel is almost ignored, and there is but scant notice of the airship branch of the service. As a very great deal is said about the development and activities of the German airship service, the impression might be created that our own authorities practically neglected this branch. Yet it seems to have been the case, and it is certainly more probable, that for the vital work of convoying ships into harbour, the non-rigid airship was more effective than any type of seaplane.

The preface explains, however, that this book cannot fairly be criticised on the same lines as most histories of the war. It was originally written for private circulation among persons interested in the doings of Great Yarmouth, and there was considerable opposition to publishing it for general consumption. To the original band of readers there would be a special interest in the list of personnel and of aircraft (giving the identification numbers) at Great Yarmouth at various times. These seem superfluous to general readers. The latter may also feel that a history of the R.N.A.S. should deal with more than the North Sea stations; while those for whom the book was first written doubtless find in it exactly the two bits of history which they want to have on record in their libraries.

Now that the book has been published, the chief drawback to its arrangement is that the first 160 pages or so make rather heavy reading. There is a danger that some readers will not persist, and that would be a pity. If they do throw the book aside, they will miss much in the last 270 pages which would stir the coldest blood. The last three-quarters of the book are splendid. With the pilots of the station we live through the almost ceaseless patrolling of the North Sea, the searching for submarines and other hostile men-of-war, the frequent Zeppelin raids, the tragedies (fortunately not too numerous) of comrades lost by sea or in action, and towards the end

some dashing encounters with German seaplanes. Three heroes stand out above the rest, the late Lieut.-Col. Vincent Nicholl, D.S.O., D.S.C.; Major R. Leckie, D.S.C.; and Major Egbert Cadbury, D.S.C., D.F.C. There must be many who met Col. Nicholl at Hayes since the war who never knew all that he had dared and endured, and how gallantly his decorations had been won. It was Nicholl and Leckie who, in 1917, brought a leaking flying-boat with one conking engine down to pick up two other officers from a sunk D.H.4. The boat, with six drenched, hungry, and thirsty men aboard her, was afloat for three days and nights before it was found—thanks to a gallant carrier pigeon. That story is worth reading and re-reading many times. It was Leckie who led out five boats to draw the seaplanes from Borkum into action, and finally led his three remaining boats in a head-on charge against 15 or 16 German seaplanes. After a desperate fight the enemy were put to flight but not before several of their machines had been shot down. Two British boats were interned in Holland, and one British officer was killed in the fight. Major Cadbury's speciality was hunting Zeppelins. Many were his disappointments when he saw the airships climb above his ceiling into clouds, and many a trying time he had finding his way home and landing in the dark. But on November 28, 1916, he shot down L 21 in flames; and on August 6, 1918, he also wrought the destruction of Germany's best airship, L 70, which had on board the chief of the German naval airships, Peter Strasser. Leckie was Cadbury's observer on that occasion and actually fired the shots which set the hydrogen alight. Leckie also piloted the flying-boat from which, on May 14, 1917, the L 22 was shot down in flames by Flight-Commander C. V. Galpin. No charge of dullness can be brought against the accounts of these incidents.

The author's method of presenting his matter is somewhat original, and is to be commended. Though the compiling of accurate chronicles is his strong point, he can tell a stirring story very well when he must. Yet he never does so if he can help it. In most cases he makes the hero of an incident tell his own story, and as these accounts are not formal reports but chatty, personal descriptions, the result is excellent. He has also persuaded various German officers to contribute their versions of certain actions, and these accounts, though naturally more restrained, are certainly an important feature of the book.

The volume is illustrated with a number of good photographs, some from German sources, and by numerous drawings of machines from the pencil of Mr. Leonard Bridgman, who was at one time an officer of Great Yarmouth station.

F. A. DE V. R.

* By C. F. Snowden Gamble, Oxford University Press. 21s. net.

Practical Woodworking Books

THERE must be many readers of FLIGHT who are interested in woodworking and to these the volumes upon "Cabinet Construction" and "Woodwork Tools and How to Use Them," just issued, should make a strong appeal, as they deal with the subject most lucidly, some 300 clear diagrams assisting the reader in the former case, the latter book also being fully illustrated. These are new volumes in their series, published by Messrs. Evans Brothers, Ltd., of Russell Square, and are supplemented by a 6d. monthly journal under the title of *The Wood Worker*.

R.A.F. Diary

WE would draw our readers' attention to the 1929 Diary of the Royal Air Force and British Empire Air Services, published, as usual, by Gale & Polden, Ltd., Aldershot. It is as informative and up to date in air matters and records as in previous issues, and introduces interesting information of civil aviation statistics for the years 1923-27. It is as useful for those in civil aviation as for the Royal Air Force officers and airmen. Prices are 1s. 6d. and 2s. for the blue cloth editions, and 3s. for the Royal blue leather edition. Postage is extra. The Diary can also be supplied in refill form complete in solid blue Morocco leather wallets for 7s. 6d. complete. Ten per cent. of the published price of each copy sold will be handed to the Royal Air Force Memorial Fund.

D.H. "Moth" Production in America

AMONG recent purchasers of D.H. Gipsy-Moths through the Moth Aircraft Corporation, Graybar Building, New York, are Mr. George Washington, Jr., of Mendham, N.J., and the Heyer Products Co., Inc. (B. F. W. Heyer, president),

of Newark, N.J. Mr. Washington's machine is for his private use, whereas that of the Heyer Products Co., who are manufacturers of service battery chargers and electrical test equipment, is to be used for executive contact with their 11 sales branches, also as a laboratory for development of magnetos and electrical test equipment for the aviation industry. Both machines are equipped with the Handley-Page slotted-wing device and are imported models of the type which the Moth Aircraft Corporation will build at its plant at Lowell, Mass.

A Useful Stop-Watch

It very often happens that one wants to time some object or event—at flying meetings, for instance, the times taken by competing machines to cover certain distances, etc.—with a fair degree of accuracy. Only a few, however, possess stop-watches, for generally speaking these are expensive instruments, and are only employed when very accurate and special readings are required, so that more often than not the second-hand of one's ordinary watch is employed with a not very high degree of accuracy. We have just been trying out a remarkably cheap "centre-seconds" stop-watch which should come in very handy for occasions such as described above. This is a 30-hour watch with ordinary minute and hour hands, and also a centre seconds-hand (giving readings of $\frac{1}{2}$ second) which can be stopped and started by sliding a knurled piece on the rim of the watch. It is a guaranteed instrument, being fitted with a lever movement, and while, of course, it does not work on the fly back principle, it should, we think, prove to be quite a useful instrument. It is supplied by A. Arnold and Co., 17, Elmcroft Avenue, Golders Green, N.W.11, and costs only 7s. 6d.

THE ROYAL AIR FORCE

London Gazette, December 11, 1928.

General Duties Branch

The follg. are granted short service commns. as pilot officers on probation with effect from and with seniority of the dates stated:—J. A. Lawson (Lt., A.I.R.O.) (Nov. 19); E. C. A. Wheeler (Nov. 19); W. H. E. Tew (Nov. 25). The follg. Pilot Officers are promoted to rank of Flying Officer:—P. C. Fair (May 15); D. K. Hewison (July 10); P. D. Cracroft (Sept. 19); C. R. Clarke (Nov. 2); G. E. Klein (Nov. 2); J. F. McKenna (Nov. 2). The follg. are promoted with effect from Dec. 12:

Flight Lieutenants to be Squadron Leaders: W. A. C. Morgan, M.C., D. W. Clappen, R. E. G. Fulljames, M.C., C. Turner, A.F.C., E. S. Goodwin, A.F.C., R. V. Goddard, J. G. S. Candy, D.F.C., S. T. Freeman, M.B.E., F. W. Walker, D.S.C., A.F.C., D. Colyer, D.F.C., H. W. Woollett, D.S.O., M.C., F. H. Laurence, M.C., E. A. Fawcus, F. O. Soden, D.F.C., T. H. Newton, D.S.C.

Flying Officers to be Flight-Lieutenants: F. P. Smythies (Hon. Flight-Lt.), G. S. White, C. V. Lock, R. A. B. Stone, W. A. Opie, R. B. Jordan, R. W. G. Lywood, O. R. Pigott, A. J. R. Moss, J. W. Colquhoun, F. V. Beamish, S. G. Connolly, G. N. P. Stringer (Lt., R. W. Kent Regt., R.A.R.O.), I. A. Bertram (Hon. Flight-Lt.), R. L. Bajeman, H. J. Gearing, C. Guppy, D. S. Brookes, B. W. Duley, M.M., H. I. Cozens, G. L. Gandy.

The follg. Pilot Officers on probation are confirmed in rank (Dec. 9):—S. O. Buffon, S. R. Ubee, J. A. S. Outhwaite, D. Menzies, W. F. Murray, R. R. Carroll, C. H. R. Little, G. Wood, J. D. Richardson, H. G. Hamilton, F. L. Truman, F. B. S. Downey, G. F. Overbury, G. F. Hales.

The follg. are placed on retired list at their own request:—Air Commodore J. A. Chamier, C.B., C.M.G., D.S.O., O.B.E. (Dec. 7); Squadron-Leader C. G. Burge, O.B.E. (Dec. 1); Flight-Lt. S. C. Black, M.M. (Nov. 18); Flight-Lt. M. H. Coote (Dec. 12). Flight-Lt. D. Gilley, D.F.C., is placed on retired list at his own request and is permitted to retain rank of Squadron Leader (Oct. 12).

The follg. are transferred to Reserve:—Class A.—Flying Officer H. W. Allen (Dec. 3). Class B.—Flight-Lt. O. W. Clapp (Nov. 28); Flight-Lt. H. W. McKenna, D.C.M. (Dec. 12); Flying Officer E. A. Turnbull (Dec. 5). Class C. Flying Officer C. G. H. E. Lumsden (Dec. 9). Lt. S. T. Morgan, R.N., Flying Officer R.A.F., ceases to be attached to R.A.F. on return to Naval duty (Dec. 1). The follg. resign their short service commns.:—Flying Officer E. T. M. Smalley (Dec. 5); Pilot Officer on probation R. G. Whalley (Dec. 12). Pilot Officer on probation J. W. Stevens relinquishes his short service commn.

on account of ill-health (Dec. 12). The short service commn. of Pilot Officer on probation R. F. J. Doran Webb is terminated on cessation of duty (Dec. 1).

Stores Branch

Pilot Officer H. J. Butler is confirmed in rank and promoted to rank of Flying Officer (Oct. 15).

Medical Branch

The follg. Flight Lts. are transferred to Reserve, Class Dii:—E. A. Aslett (Dec. 1); W. Parsons (Dec. 3).

Temporary Capt. A. R. H. Bennett (General List, Army, Dental Surgeon) is granted a temp. commn. as Flight-Lt. on attachment to R.A.F. (Nov. 12); Flight-Lt. H. J. Procter is promoted to rank of Squadron Leader (Dental) on promotion to rank of Major in the Army Dental Corps (Nov. 13). The follg. Flying Officers (Temp. Lts., General List, Army) are promoted to rank of Flight Lt. (Dental) on promotion to the rank of Temp. Capt. in the Army:—H. I. Clapperton (Oct. 14); A. P. McClare (Nov. 21).

Chaplains Branch

The Rev. J. F. Cox, M.C., M.A., is granted a permanent commn. (Nov. 22).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer:—Class A—1. J. Sankey (Nov. 10). Class AA.—E. F. Rhodes (Dec. 8); D. F. C. Brecknell (Dec. 8).

Special Reserve

N. D. Wardrop (Nov. 2); T. H. Worth (Nov. 19).

The follg. Flying Officers are transferred from Class A to Class C:—H. D. Wardle (June 2); D. R. Sharman, M.C. (Oct. 28). Flying Officer R. Hall is transferred from Class B to Class C (Oct. 24). The follg. relinquish their commns. on completion of service:—Flight Lt. H. S. Shield, M.C. (Nov. 19). Flying Officer W. R. Rogers (Nov. 28); Flying Officer W. Mellor (Dec. 9).

Flight-Lt. H. H. Clarke relinquishes his commn. on completion of service and is permitted to retain his rank (Nov. 28).

Medical Branch

Flight-Lt. Game resigns his commn. on appointment to a commn. in the Royal Army Medical Corps (Aug. 7); Flight Lt. B. C. W. Pasco relinquishes his commn. on completion of service (July 17).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: G. W. Murlis-Green, D.S.O., M.C., to No. 1 (Indian Wing) Station, India, to command, 1.11.28. J. B. Graham, M.C., A.F.C., to R.A.F. Station, Tangmere, to command, 1.12.28. H. J. F. Hunter, M.C., to R.A.F. Depot, Uxbridge, Supernumerary, pending posting, 10.11.28.

Squadron Leaders: A. G. Bishop, A.F.C., to No. 1 Indian Group H.Q., India, 1.11.28. H. G. Bowen, M.B.E., to H.Q., Air Defence of Great Britain, Uxbridge, 17.12.28. J. Noakes, A.F.C., M.M., to R.A.F. Depot, Uxbridge, 1.12.28. T. C. Thomson to R.A.F. Depot, Uxbridge, 23.11.28.

Pilot Officers: H. J. Cross to No. 27 Sqdn., India, 22.10.28. V. B. J. Jackson to R.A.F. Cadet Coll., Cranwell, 19.12.28. M. G. Philpott to No. 3 Flying Training Sch., Grantham, 19.12.28.

Stores Branch

Flight Lieutenants: H. T. H. Copeland and A. B. Wiggin, to R.A.F. Depot, Uxbridge, 3.12.28. H. L. Woolveridge to H.Q., Iraq, 20.11.28.

Flying Officers: H. Parker to No. 1 (Indian Wing) Station, India, 1.11.28. W. A. G. Goldsworthy to No. 2 (Indian Wing) Station, India, 1.11.28. R. F. Wilson and P. H. Wilcox to R.A.F. Depot, Uxbridge, 3.12.28.

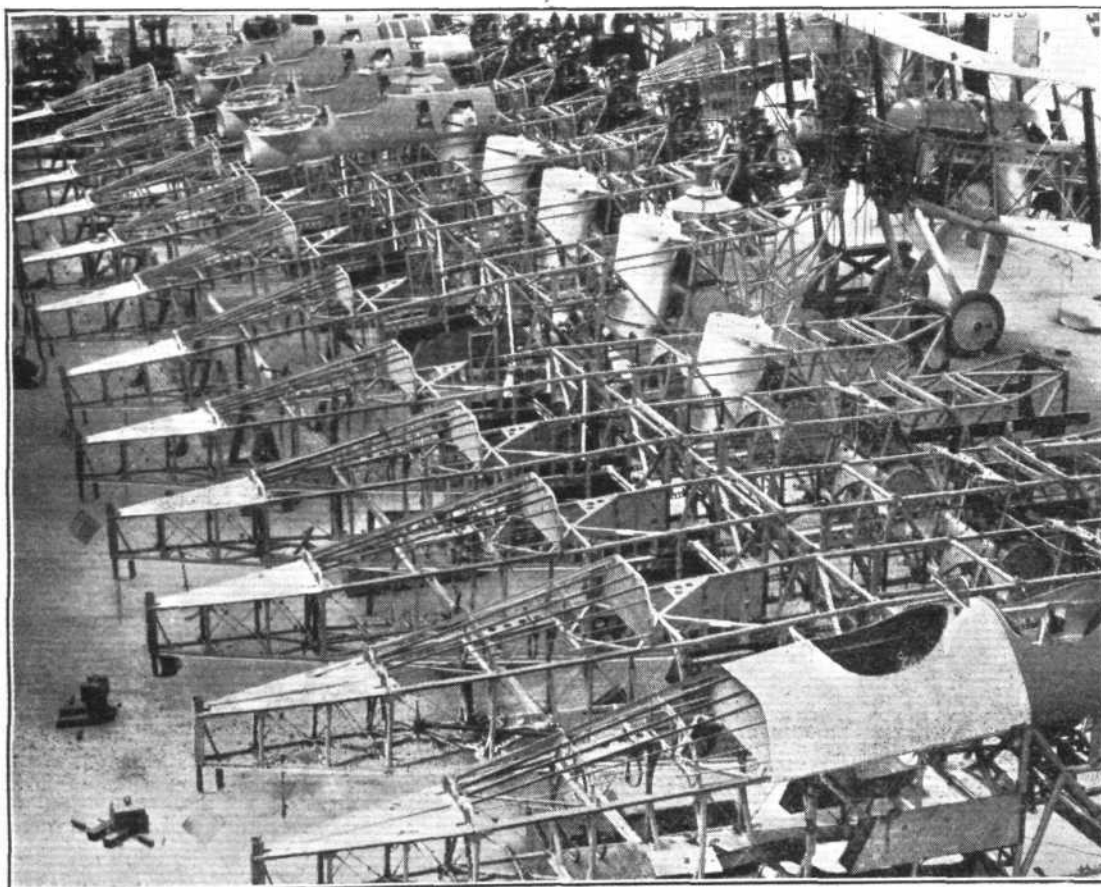
Accountant Branch

Squadron Leader I. L. Wincer to R.A.F. Base, Gosport, 1.12.28.

Flying Officer C. L. Dook to R.A.F. Base, Kai-Tak, China, 6.12.28.

Medical Branch

Flight Lieutenants: J. McM. Wilder to R.A.F. Station, Upper Heyford, 7.1.29. T. V. O'Brien, M.B., to H.Q., Middle East, 27.11.28.



Mass Production at Yeovil: This photograph, taken in the Westland Aircraft Works, shows some of the "Wapitis," which are now being built for the Royal Air Force. This machine incorporates several novel forms of all-metal construction. The engine fitted is the Bristol "Jupiter."

AIR POST STAMPS

By DOUGLAS ARMSTRONG

(Editor of "The Stamp Collector")

Air Post in San Domingo

AN air post service between San Domingo, Hayti, and Porto Rico was put in operation on December 2, 1927, under the ægis of the West Indian Aerial Express Company, thus providing another link in the chain of American air posts. About 600 covers were carried on the inaugural flight, bearing the impression of a special cachet in blue, "Correo Aereo por Avion Santa Maria." One week later the service was extended to Hayti and a special aero stamp of 12 centavos denomination is in course of preparation.

Aero Stamps in Prospect

Besides the foregoing, new air post stamps are to be issued in Egypt for the proposed daily service between Cairo and Alexandria, in Tunis, and in the Central Asiatic Soviet State of Touva, where the Soviet air lines are about to be extended.

The Republic of Panama has commemorated the recent landfall of Col. Lindbergh on his Central American flight by the issue of special stamps of 2 c. and 5 c. denomination, the one showing his aeroplane, the "Spirit of St. Louis," flying over the isthmus, and the other the landing of the "Lone Eagle" in Panama. Lindbergh stamps have also appeared in Costa Rica and Cuba to mark the course of his triumphant flight.

* * *

In January last, the Peruvian government caused 3,000 copies of the ordinary 50 centavos postage stamp to be overprinted "SERVICIO AEREO" for service over the newly established air route from Lima to Iquitos. Originally sold for about 1s. 6d., this particular stamp is now quoted at 15s. a copy, and even at that is hard to obtain as it has been supplanted by a large and rather elaborate stamp of the same denomination, engraved and printed in green with a biplane in flight over an outspread map of Peru, and a portrait of President A. B. Leguia inset. Across the top of the designs run the motto "Rapidez Progreso."

* * *

Some remarkable instances of appreciation in the market values of rare air mail stamps and covers are recorded in the latest (1928) edition of *Champion's Catalogue Historique des Timbres de la Poste Aérienne*, just published in English and French text, at 6s. 6d. The Ross Smith vignette of Australia is quoted at 20,000 francs unused, and 16,500 francs on "flown cover"; the Newfoundland "Hawker" at 15,000 fr. unused and 13,000 flown; the 24 c. U.S.A. air mail stamp with *inverted aeroplane* at 25,000 fr.; all of which constitute a considerable increase upon the prices for the same items ruling three years ago.

Answers to Correspondents

J. S. (California).—The only English catalogue of Air Post stamps is that published by Mr. Alan Turton, 22, Beauchamp Place, London, S.W.3, at \$2. It is quite practicable to get together a collection of all air mail stamps that have been issued to date in unused condition, although some of the scarcer items run into money.

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IMPORTS AND EXPORTS

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910.)

For 1910 and 1911 figures see FLIGHT for January 25, 1912.

For 1912 and 1913, see FLIGHT for January 17, 1914.

For 1914, see FLIGHT for January 15, 1915, and so on yearly, the figures for 1927 being given in FLIGHT, January 19, 1928.

	Imports.		Exports.		Re-Exports.	
	1927.	1928.	1927.	1928.	1927.	1928.
Jan. ..	1,850	1,220	49,021	157,598	—	330
Feb. ..	679	1,772	63,080	118,622	—	345
Mar. ..	7,087	4,805	106,478	125,901	2,270	1,307
April ..	822	2,904	71,190	134,126	785	3
May ..	1,258	2,513	82,708	118,804	640	640
June ..	1,249	5,916	149,907	86,245	162	1,317
July ..	1,798	2,025	104,167	108,746	750	521
August	2,453	2,566	78,742	97,303	—	100
Sept.	2,045	4,240	61,946	72,475	59	3,183
Oct. ..	1,013	6,098	93,004	77,027	45	315
Nov. ..	3,014	3,825	111,202	115,219	—	1,615
	23,268	37,884	971,445	1,212,066	4,711	9,676

PUBLICATIONS RECEIVED

Researches on Springs. 4.—*The Surging of Engine Valve Springs.* Engineering Research Special Report No. 10. Department of Scientific and Industrial Research, 16, Old Queen Street, Westminster, S.W.1. Price 1s. net.

U.S. National Advisory Committee for Aeronautics Reports: No. 285.—A Study of Wing Flutter. By A. F. Zahm and R. M. Bear. No. 288. Pressure Distribution over a Rectangular Monoplane Wing Model up to 90° Angle of Attack. By M. Knight and O. Loeser, Jr. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

The Register of the Motor Trade: 1928. Colonial Section. The Society of Motor Manufacturers and Traders, Ltd., 83, Pall Mall, London, S.W.1.

Report on the Reform of the British Patent System. The British Science Guild, 6, John Street, Adelphi, London, W.C.2. Price 2s.

Revue Juridique Internationale de la Locomotion Aérienne. July-August-September, 1928. Per Orbem, 4, Rue Tronchet, Paris.

Design of Tuned Reed Course Indicators for Aircraft Radio-beacon. By F. W. Dunmore. Research Paper No. 28, Department of Commerce, Bureau of Standards. U.S. Government Printing Office, Washington, D.C., U.S.A. Price 5 cents.

Receiving Sets for Aircraft Beacon and Telephone. By H. Pratt and H. Diamond. Research Paper No. 19, Department of Commerce, Bureau of Standards. U.S. Government Printing Office, Washington D.C., U.S.A. Price 15 cents.

Catalogue

Airplanes, Motors, Parts, Supplies. Nicholas Beazley Airplane Co., Inc., North and English Streets, Marshall, Mo., U.S.A.

Abhandlungen aus dem Aerodynamischen Institut an der Technischen Hochschule Aachen. Vol. 8. Julius Springer, Linkstr., 23-24, Berlin, W.9. Price, Rm. 6.

Aeronautical Research Committee, Reports and Memoranda: No. 1164 (Ae. 328).—Note on the Forces Experienced by Ellipsoidal Bodies Placed Unsymmetrically in a Converging or Diverging Stream. By Dr. H. Lamb, F.R.S. May, 1928. H.M. Stationery Office, Kingsway, London, W.C.2. Price 4d. net.

Aluminium Foundry Practice. The British Aluminium Co., Ltd., Adelaide House, London, E.C.4.

Les Routes Aériennes de l'Atlantique Aperçu Météorologique. By A. Baldit. Gauthier-Villars et Cie., 55, Quai des Grands-Augustins, Paris. Price 28 fr.

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AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1927

Published December 20, 1928

- 21,777. H. R. RICARDO. Sleeve-valve i.c. engines. (300,934.)
22,377. H. T. NONES. Parachutes. (276,988.)
26,931. H. E. S. HOLT. Parachute apparatus. (301,162.)

APPLIED FOR IN 1928

Published December 20, 1928

- 9,321. G. CATTANEO. Air-cooling of cylinders of i.c. engines. (287,881.)

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